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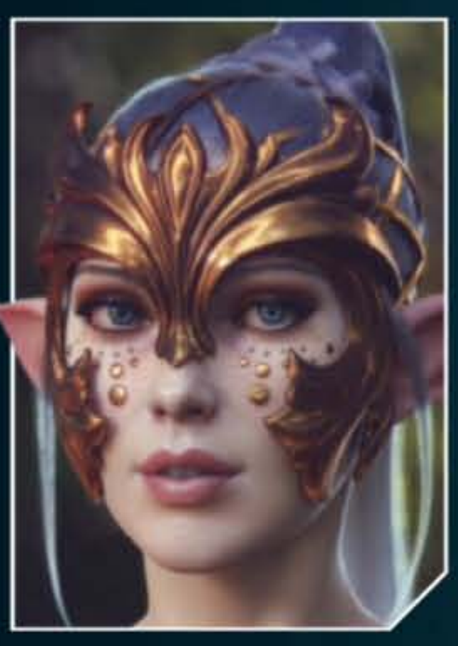

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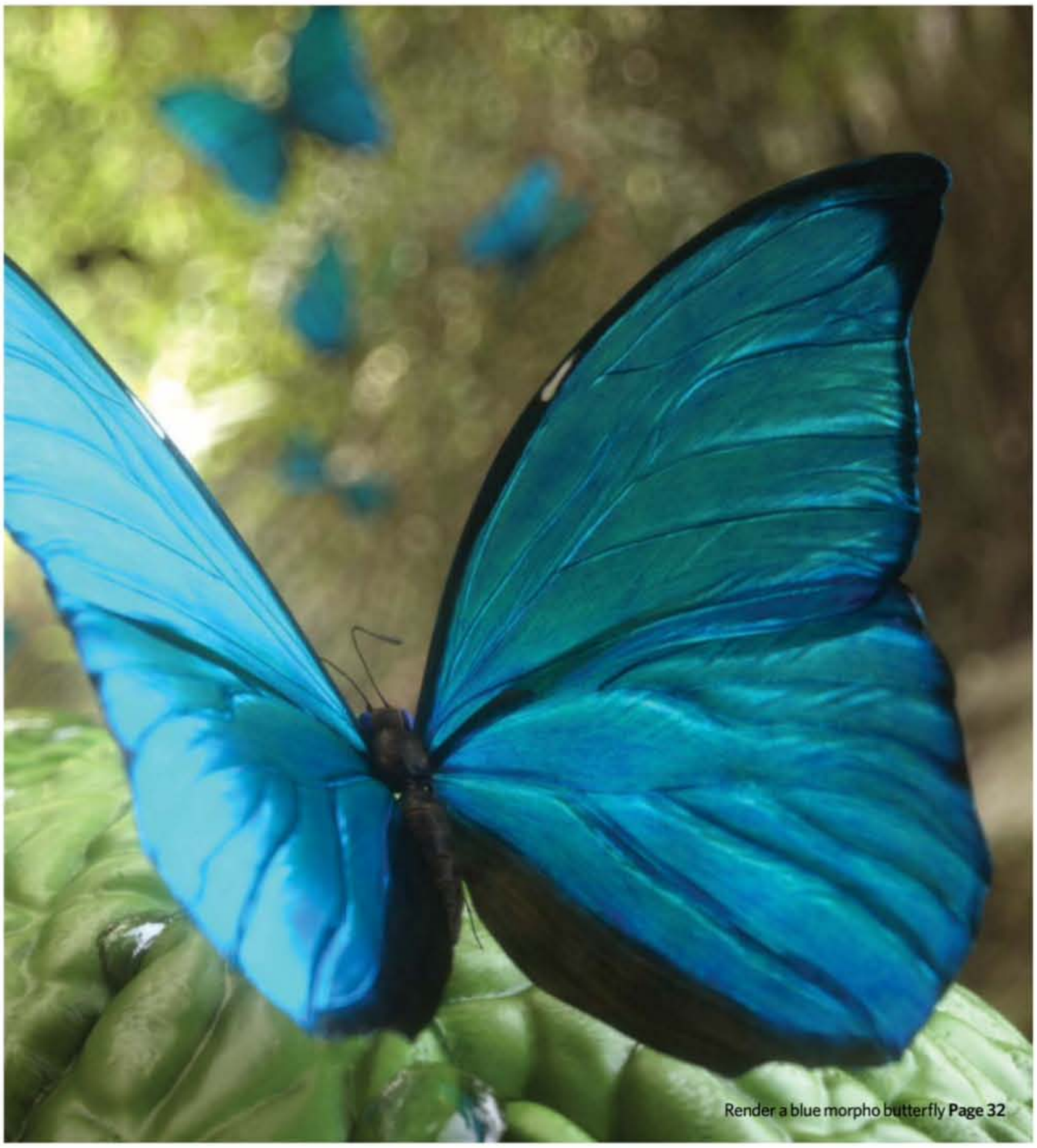
Upgrade your ZBrush skills
Page 32

> Start subdividing four or five times at level 15 to maintain very sharp edges

Jonathan Benaïnous on creating hard elements **Page 32**

Jonathan Benaïnous
jonathan-benainous.blogspot.com

Software ZBrush, Maya, Photoshop



Render a blue morpho butterfly **Page 32**

Welcome

To the magazine and 100 pages of amazing 3D

It was lovely to see Jonathan Benainous' fantastic cover image shared across social media by the ZBrush community a couple of months ago, and I'm extremely pleased to have him on board this month to show you how to re-create it over 17 easy-to-follow steps. Since joining the magazine I've found the entire 3D community to be unbelievably enthusiastic, making it a pleasure to feature such useful tutorials that all of you can utilise to improve your skills, and it's my promise that we will continue to do so.

This month we've gone above and beyond on the tutorial front, with a total of eight incredible artists coming together to create a collection of content that is as good as any we've compiled since the magazine launched. As well as our ZBrush cover image on p38, Eric Keller makes a beautiful blue morpho butterfly, Aaron Hunwick shows you how to model and texture an elf, we've got Houdini scattering, Maya animation, a ZModeler masterclass, an awesome sky substitution technique in NUKE and incredible fabric effects in Cinema 4D. Blimey.

Don't forget to check out The Hub and **3dartistonline.com** for info on how to enter our latest competition in conjunction with BFX Festival – you could win a truly unbelievable selection of prizes worth thousands of pounds including MODO, Houdini, RealFlow and V-Ray! Good luck!

Steve Holmes, Deputy Editor

Sign up, share your art and chat to other artists at **www.3dartistonline.com**

Get in touch... 3dartist@imagine-publishing.co.uk @3DArtist Facebook.com/3DArtistMagazine

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www.3dartistonline.com
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Circulation

Head of Circulation Darren Pearce ☏ 01202 586200

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Finance

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Printing & Distribution

Printed by William Gibbons & Sons Ltd, 26 Planetary Road, Willenhall, West Midlands, WV13 3XT

Distributed in the UK, Eire & the Rest of the World by Marketforce, Blue Fin Building, 110 Southwark Street, London SE1 0SU
☏ 0203 148 3300, www.marketforce.co.uk

Distributed in Australia by Network Services (a division of Bauer Media Group), Level 21 Civic Tower, 66-68 Goulburn Street, Sydney, New South Wales 2000, Australia ☏ +61 2 8667 5288

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The Expert Panel

This issue's team of pro artists...

JONATHAN BENAINOUS
jonathan-benainous.blogspot.co.uk

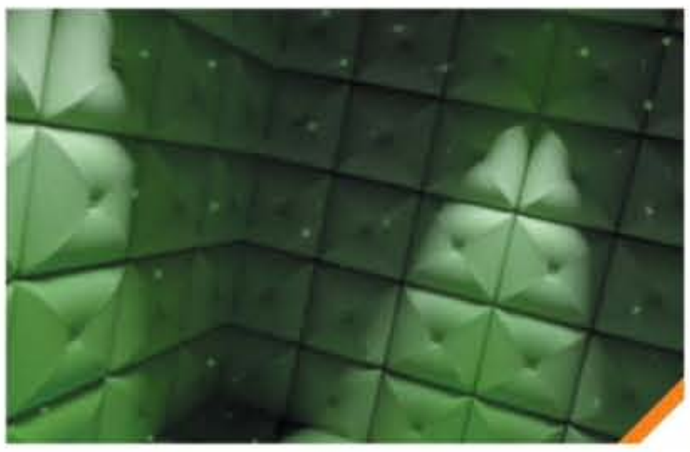
Off the back of an illustrious career in the games industry that has led him to Ubisoft, Jonathan has brought his 3D expertise to the mag for an in-depth step by step ZBrush guide on p32.
3DArtist username Jonathan Benaïnous

ERIC KELLER
bloopatone.blogspot.co.uk

The master of macro effects returns to the pages of **3D Artist** with another stunning nature tutorial, this time teaching you how to render a photorealistic blue morpho butterfly.
3DArtist username bloopatone

AARON HUNWICK
aaronhunwick.wix.com/portfolio

Tying in nicely with our 50 Fantasy Tips & Tricks feature, Aaron walks you through creating a fantasy character of your own, combining hard surface and organic modelling in ZBrush and Maya.
3DArtist username Ahunwick



RAINER DUDA
rainer-d.eu

Houdini magician Rainer returns to **3D Artist** this month to show you how to generate a cool padded cell effect using scattering techniques. You'll find his tutorial over on p56.
3DArtist username Rainerd

VALENTINA ROSSELLI
vrosselliportfolio.wix.com/vrossportfolio

We featured Valentina in the Readers' Gallery a few months ago and were so impressed that we had to get her writing a tutorial. On p60 she shows you how to animate an awesome jellyfish in Maya.
3DArtist username Valentina Rosselli

GUSTAVO ÅHLÉN
facebook.com/gustavoahlenstudio

Gustavo always amazes us with the breadth of his 3D knowledge – he seems to know every app going! This month he's here to teach you how to utilise ZModeler and Array Mesh in ZBrush.
3DArtist username gustavoahlen

PAUL CHAMPION
linkedin.com/in/pchampion

We like to keep Paul busy at all times, as we love his NUKE projects. This time he's taken a look at day for night projection using a lighthouse as his focus. It's a really cool and really useful technique.
3DArtist username Rocker

NICOLAS DELILLE
modern-age-studio.com

Nicolas oozes style in every one of his pieces of art, and this one is no different. Head over to p68 now to discover how you can create an insanely detailed wool effect in Cinema 4D.
3DArtist username ModernAgeStudio

ORESTIS BASTOUNIS
twitter.com/mrbastounis

Neck deep in wires, fans, graphics cards, power supplies and emails from Steve as usual, Orestis managed to resurface and give the Fujitsu CELSIUS M740 workstation a thorough once over on p82.
3DArtist username n/a

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50 Fantasy tips & tricks

"Realism in fantasy doesn't necessarily stem from the style or detail level, but from small details in design, clothes or accessories."

Laura Peltomäki on detailing fantasy characters **Page 22**

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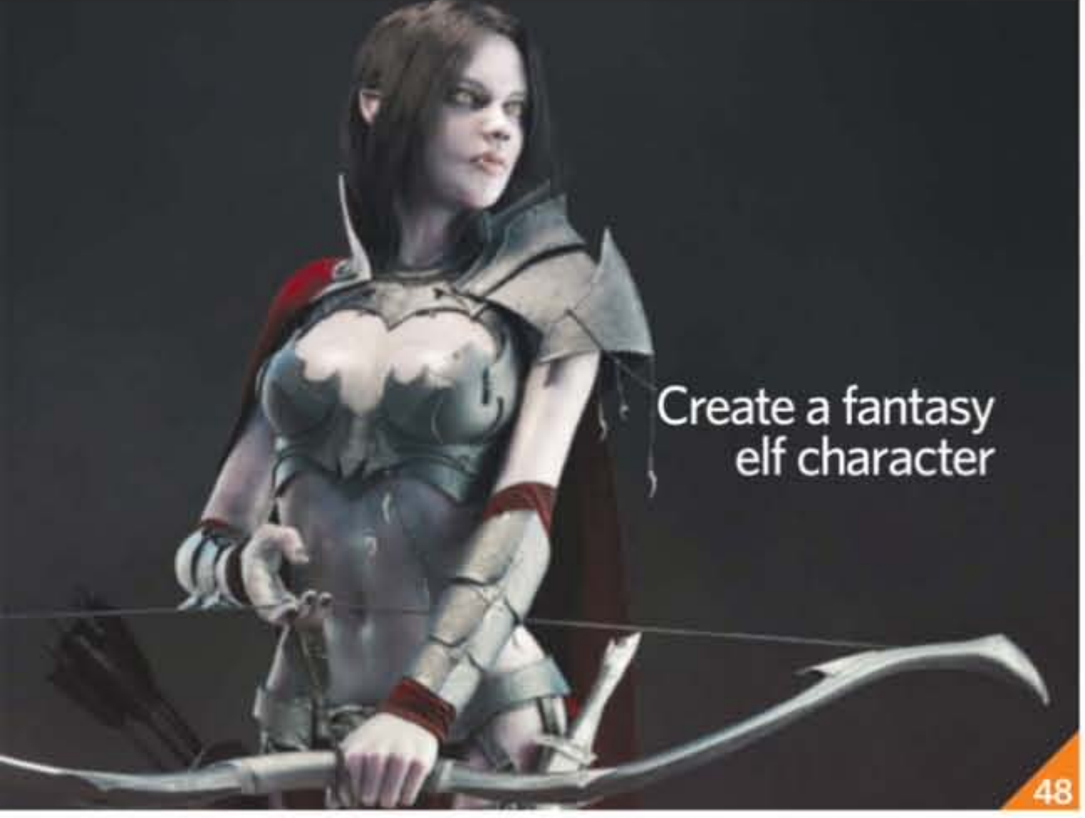

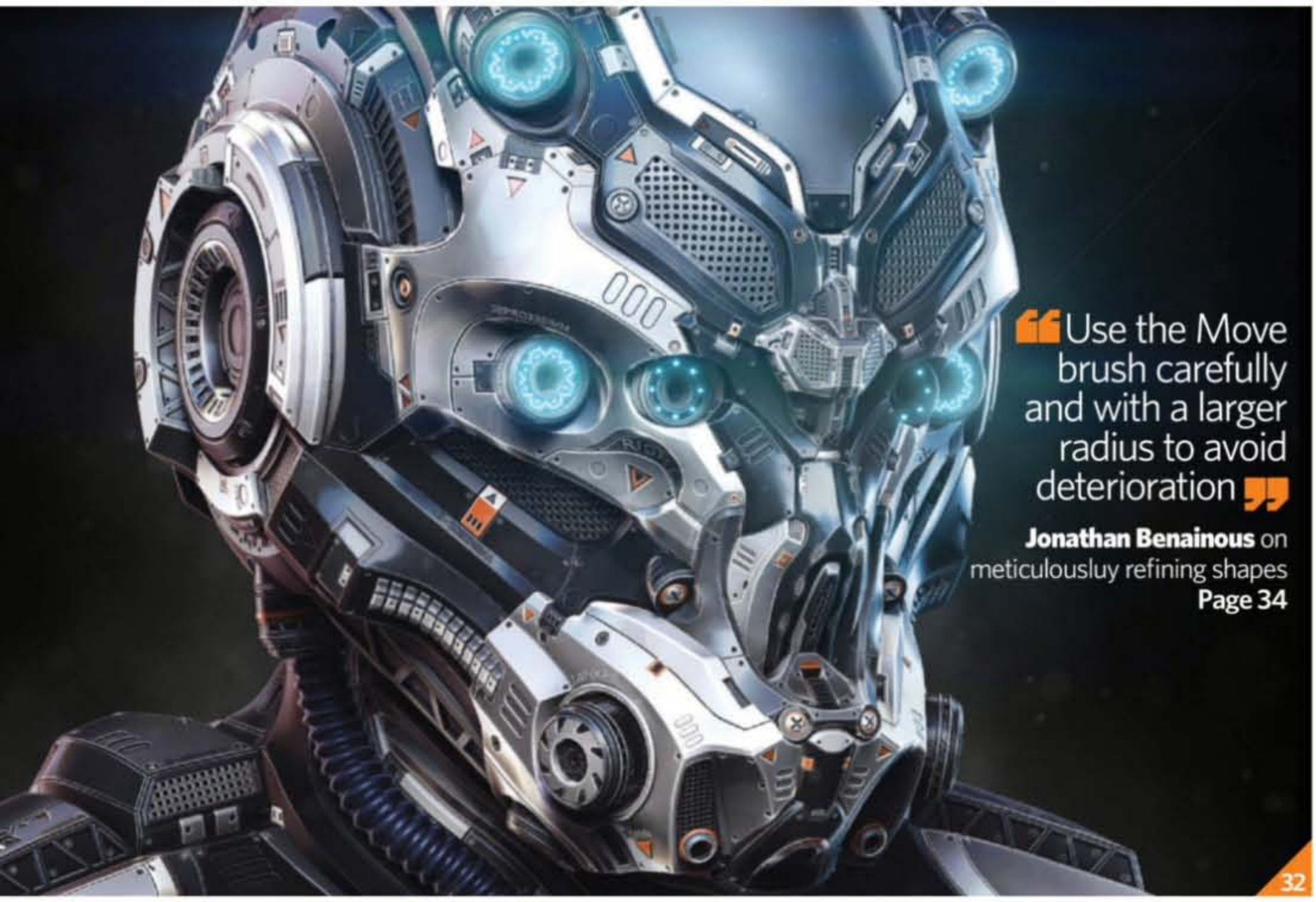
“Use the Move brush carefully and with a larger radius to avoid deterioration”
Jonathan Benainous on meticulousluy refining shapes
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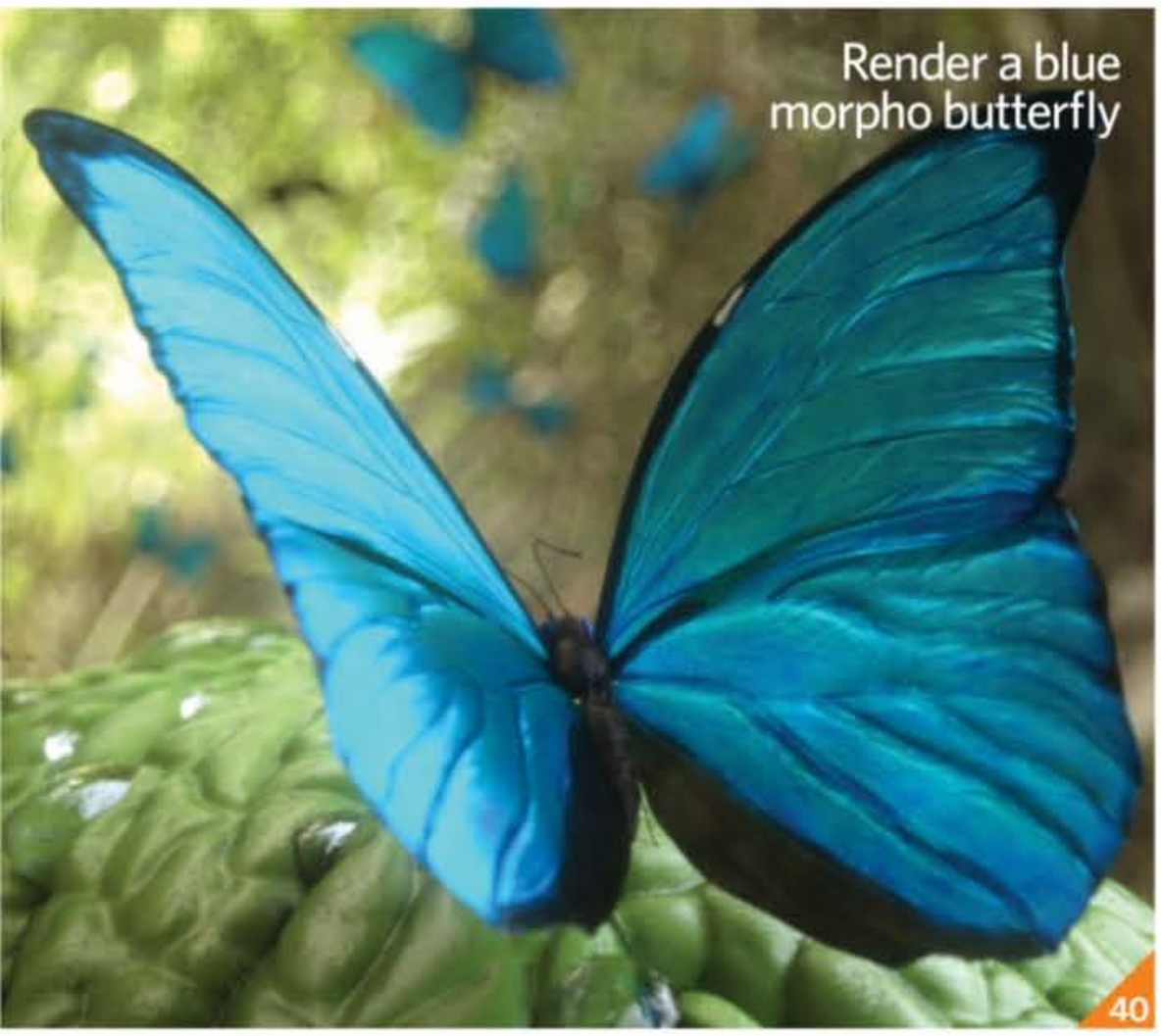

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The Gallery /

Have an image you feel passionate about? Get your artwork featured in these pages
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Martin Houra

houra.cz

Martin is from Czech Republic, but lives in Australia where he avoids spiders and snakes

Software 3ds Max, Corona, ZBrush, Photoshop

Work in progress...

"This is the second still life image in the series, this time featuring all aspects of the animal kingdom"

Martin Houra, *Snake, roe skull and the ACR assault rifle (Still Life)*, 2015

Gilberto Zaragoza Vigil
artstation.com/artist/s0r3n

3DArtistOnline username:
Soren Zaragoza

Software ZBrush, KeyShot, Photoshop

Work in progress...

“This piece was done in collaboration with my friend Carlos Sallas. For rendering I chose KeyShot because I find it so intuitive and easy to achieve impressive results”

Gilberto Zaragoza Vigil, *The Creator,* 2015

Diego Querol Sanguesa

diego3dq.com

A 3D artist based in Barcelona, Diego won a CGarchitect award for this image

Software 3ds Max, V-Ray and Photoshop

Alternative render...

> It took me about three months to complete this project, working on it during my free time. For many days this was looking like a complete nightmare, but in the end there is a nice harmony between composition, colours and materials

Diego Querol Sanguesa, *Arts&Crafts*, 2015

“The main reason for this character’s creation was to test myself in organic forms, hard surface modelling, clothing and environment, and in creating a topology suitable for the cinematic and realistic texture shaders”

Mattia Munafò, *Cyberpunk girl*, 2014

Mattia Munafò

mattiamunafo.wix.com/3dartist

Mattia is a freelance modeller, texture and shader artist devoted to character creation

Software ZBrush, Maya, UVLayout, MARI, V-Ray, Photoshop

Work in progress...

Kirill Bulgakov
artstation.com/artist/alvp

Kirill is a freelance concept artist who started his career as a 3D modeller

Software ZBrush, Maya, Photoshop

Alternative render...

“This concept art of a diver was done for a currently unannounced project. The original project brief was to re-create a suit that real commercial divers use nowadays”

Kirill Bulgakov, *Diver,* 2015

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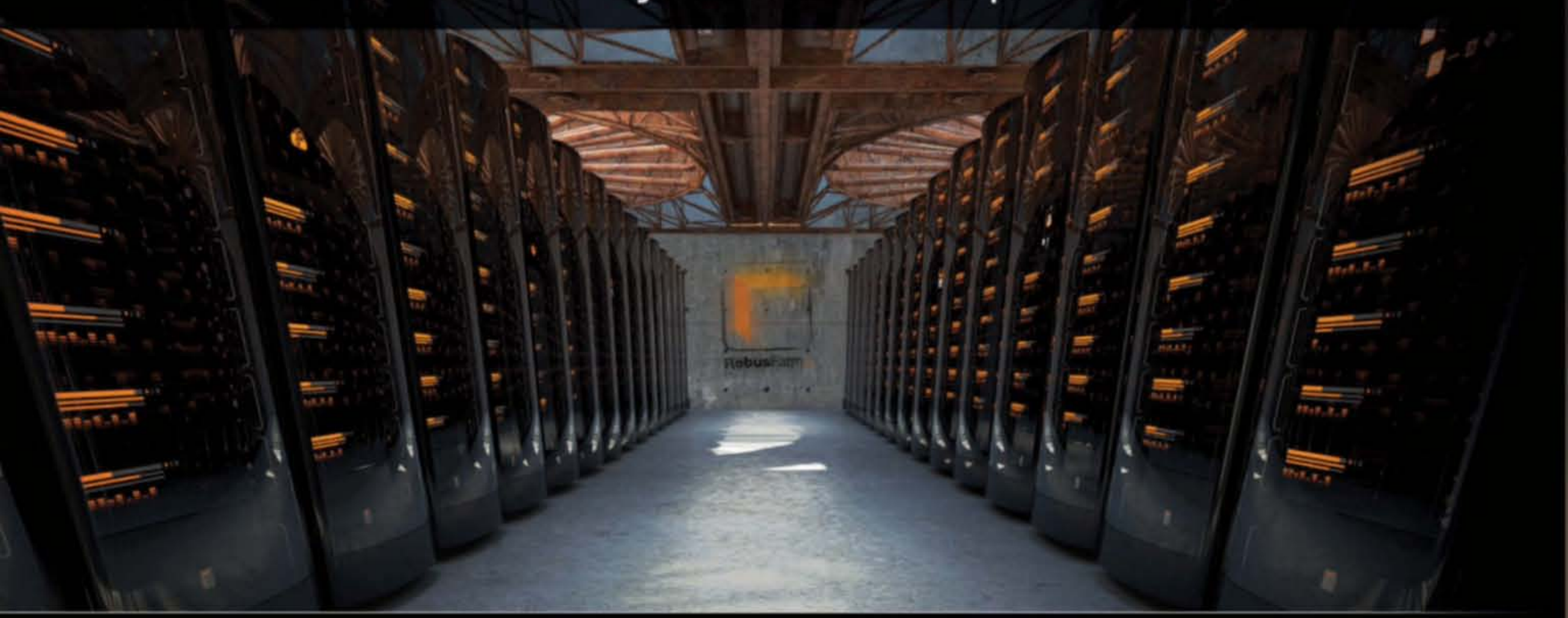

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Technique focus

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LIGHTING First I imported Mario Rossi's model into KeyShot. My job in this project was with composition, shading, lighting and postproduction. I used Colorsponge's tyre sidewall texture and EXIDGE's backplate with a corresponding HDRI to illuminate the scene. I adjusted the HDRI's light source intensity and rotation to match reflections, shadows and brightness.

Germano Vieira
picsimstudio.wix.com/picsimstudio

3DArtistOnline username
PICSIM studio

Software ZBrush, Maya, Marvelous Designer, KeyShot

Ferrari 250 GTO, 2014

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50 FANTASY TIPS & TRICKS

Expert artists reveal their secrets for incredible fantasy art, from concept to completion

It's all in your imagination. There are some things you never want someone to tell you, and being told that you're 'just imagining things' is probably at the top of the list – yet quiz any fantasy artist on what's the key ingredient to breathtaking 3D art and that's exactly what they'll exclaim.

Over the next few pages find out how to breathe life into your fantasy art with key insight and advice from some of the best artists around. With 50 tips to guide you from concept to creation, you'll discover the essential tricks for incredible 3D characters, creatures and environments.

Create a fantasy elf
Page 48

THE EXPERTS

Ruben Alvarez
rubenalvarezdesigns.com

Ken Barthelmey
theartofken.com

Nuttavut Baiphowongse
artstation.com/artist/gibbon

Francesc Camós
craftfranship.weebly.com

Dmitry Cheremisin
artstation.com/artist/d33m0n

John William Crossland
johnwcrossland.com

Giovanni Dossena
futureboy.it

Anthony Eftekhari & Fabio Zungrone
thematteddepartment.com

Ovidiu Enache
enaov.ro

Joshua Haun
jhaun-environmentart.com

Alexey Kashpersky
kashpersky.com

Arda Koyuncu
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Laura Peltomäki
artstation.com/artist/k4ll0

Tiago Rios
tiagorios.com

James Suret
zerojs.cgsociety.org

Castle Von Jessenstien by Joshua Haun

Atlantis Herald by Alexey Kashpersky

Build your concept

01 Plan your project The best advice I can give is to plan exactly what you want to do and when. When going by trial and error, it's easy to lose time – often, personal projects won't get finished. Starting with good references and concepts is essential. *Giovanni Dossena*

02 Look for inspiration I usually use Pinterest and Google to look for ideas and references. ArtStation is a good place to see the work of other artists. Sometimes ideas and inspiration come to me after watching movies, cartoons or even from playing videogames. *Dmitry Cheremisin*

03 Collect references Gather a lot of documentation and always reference anatomy – both human and animal – in order to make a believable creature. Pictures of animals, insects and even trees and rocks are great. Nature is the best source of inspiration. *Ovidiu Enache*

04 Think of the details I always try to make my fantasy characters seem like real, actual beings of their own worlds. The more narrative detail you're able to get into your character, the more real they feel. Realism in fantasy doesn't necessarily stem from the style or detail level, but from small details in design, clothes or accessories. *Laura Peltomäki*

05 Combine imagination with reality If you design a creature too fantastical, it will look unbelievable and silly – and vice versa. If you make a design too realistic, it will look boring. In order to make a good design, I think it's important to have a good blend of realism and imagination. I love seeing an actual anatomy in a design, even if it's mechanical. Using reference photos from real animals is always a great help to accomplish that. *Ken Barthelmey*

Troll Dreek by John William Crossland

06 Give your art a backstory I would begin each concept with a few words that would describe the personality of the creature. *John William Crossland*

07 Work on sketches I did a couple of sketches on paper, which was more about research of general shapes, then made another sketch in Photoshop which became a start point for modelling in ZBrush. Explore how all living creatures live, their environments, and how it affects their shape and form. Try to draw them and the understanding will come. *Alexey Kashpersky*

08 Create rough sculpts When working, I use sculpting as a concepting phase. David Jon Kassan, a traditional artist, talks about drawing as sculpting – sculpting with the pencil. I try to think of drawing and sculpting as the same medium. *John William Crossland*

Modelling

09 Think about the tone It's important in fantasy illustrations to create a sense of scale and drama. The lightning strikes in the background of 'The Binding' along with the clouds create a sense of depth and excitement. *James Suret*

10 Learn from your mistakes Don't be scared to fail; explore everything and anything – your first idea won't be the best nor the last. Having learned from my own personal failures, reference is key, so study everything in the natural world. They're great references for creatures and fantasy worlds. *John William Crossland*

Werewolf by Ruben Alvarez

11 Be critical of your ideas Don't be afraid to make huge changes half way through modelling. It's easy to get attached to your character and avoid making a large change to the design because you're used to seeing it the way it currently is. *James Suret*

12 Use a base mesh If you want to create a humanoid character, you can save some time by starting from a premade base mesh. But if you want to be more creative with the anatomy, make the basic skeleton using ZSpheres in ZBrush. *James Suret*

13 Don't be afraid to kitbash Once you have an idea of the overall shape and proportions of the character you can save time by using a premade kitbashing set, such as the free monster packs from **badking.com.au**. Then you can modify these inserted body parts to suit the character's style and scale. *James Suret*

14 Split it into Polygroups Use Polygroups for your base mesh, with sections for the head, lower jaw with the lower lip, oral cavity, upper and lower eyelids and the ears. This will allow you to quickly hide unnecessary parts of the mesh and sculpt easily. *Dmitry Cheremisin*

15 Embrace plugins If you are a user of 3ds Max, you really should search for scripts and additional plugins – that's the main advantage of the software, in my opinion. I always tend to use plugins such as Quad Chamfer, XFormer 2.0, TexTools and MultiImport. *Tiago Rios*

16 Create a custom interface To work more effectively and faster, I have created my own custom user interface. It's great to have all the tools and icons, which I'm using a lot, in a cruising radius. *Ken Barthelmey*

17 Let your eyes rest If you are focused for too long on the same thing you might lose sight of the overall picture. However, if you leave your composition for a day or two, then when you come back to it, you might be able to see it under a new light, spotting mistakes or discovering new options that you might have missed from before. *Francesc Camós*

18 Share your work Share your work-in-progress images with friends and colleagues – any constructive critique and hints you get from them will most certainly prove invaluable. *Francesc Camós*

19 Use Alpha maps Alpha maps or stencils are incredibly helpful for making things like pores. These can then be made from scans, photos or sculpts, but do bear in mind that pores have a particular kind of structure – you shouldn't use the same stencil for all parts of the skin. *Dmitry Cheremisin*

Get inspired

Discover the cultural pieces that have inspired some of the most incredible fantasy art around

01 Arguably the most famous fantasy author in the world, Tolkien's literary adventures through Middle-earth have inspired plenty of 3D artists. Francesc Camós cites Tolkien as his inpiration, stating, "The story about the dragon Glaurung and *The Children of Húrin* have always thrilled me since I read them when I was about 16-years-old." Likewise, John William Crossland explains, "The idea for the trolls initially came from the release of *The Hobbit* films. I saw some of the models created by Andrew Baker of Weta and it sparked my initial interest."

02 It's not all about finding inspiration from words, as comics and art books can be equally motivating. Alexey Kashpersky explains that in Atlantis Herald, "The idea to create this picture was born from inspiration of Boris Vallejo artworks and two books – *The Old Man And The Sea* by Ernest Hemingway and *Hyperion* by Dan Simmons."

03 Sometimes all you need is an idea to work with, and Laura Peltomäki explains that mythology played a big part in her sculpt: "In Finnish folk stories forest maidens are half-tree, half-women, who sometimes make men disappear by luring them deep into the forest. Since they are usually described as neutral spirits I didn't want to make her look like a traditionally beautiful tree nymph but not a horrible monster either."

20 Pose properly It's important to gather references. Before posing, I start playing with ZSphere mannequins that come with ZBrush. They are very simple to use and you can get a general idea of the pose you are looking for. The pose must be readable in all angles, so the character won't end up looking strange when you do a turntable render. *Tiago Rios*

21 Don't do more than you need When I do a 3D sculpt, I only sculpt one side first to show the client. After we've sent all the designs to them, they will pick one or two angles and then we will develop that design to finish. *Nuttavut Baiphowongse*

Glaurung & Turin by Francesc Camós

Texturing

22 Combine hand-painting with tiled textures I hand-painted the majority of the textures on my character. I tried to sculpt the character in very high detail, so in the end when I was texturing in MARI, I used the surface detail coming from ZBrush as a guide. I then used a bunch of tileable photos on top of my hand-painted textures to introduce different hues to my Color map. *Arda Koyuncu*

23 Consider white balance If you are using photo references for the texturing process, don't forget about accurate colours, known as white balance. If you don't use it, you run the risk of being guided by the 'wrong' colour. *Dmitry Cheremisin*

24 Avoid repetitive patterns The main thing is don't create patterns that the eyes can easily recognise. In nature there's no such thing as straight lines or equal distances between things. It's exactly the same with orientation and size. *Giovanni Dossena*

25 Be sensible with maps I paint the environment in Photoshop using a camera projection and use MARI for texturing. I try to use as many masks as I can, like several Ambient Occlusions with different ranges, cavities, and snow or axis maps. These are very helpful but also dangerous if you overuse them. The trick is to be subtle, trying not to apply them straightforwardly with a blending mode but using them as masks for other textures and breaking them by hand or using procedural noises. *Francesc Camós*

26 Use PolyPaint in ZBrush Texturing can be done quickly with PolyPaint in ZBrush using different brushes and textures (Alphas), and then I've converted the PolyPaint data into textures for rendering in KeyShot. *Ovidiu Enache*

27 Save some of it for Photoshop I usually use PolyPaint in ZBrush. Nothing very detailed, just a colour base and a couple of details. Then I polish my render using photo textures on top of the renders in Photoshop. *Ruben Alvarez*

28 Try PBR shading Start with basic PBR shaders like a simple stone or brick and then layer them with other shaders to create the detail or dirt seen on the textures for the model – almost like blending layers in Photoshop. To change where the different shader layers were blending I used black-and-white mattes to act as Alphas. For these black-and-white mattes I usually used dirt textures with transparency or Ambient Occlusion masks I pulled from the models. *Joshua Haun*

“Don't forget about accurate colours, known as white balance. If you don't use it, you run the risk of being guided by the ‘wrong’ colour”

BI355 by Dmitry Cheremisin

Little Mushrooms by Giovanni Dossena

Lighting & Rendering

29 Use references Study some master painters like Delaroche and Rembrandt. It really helps to see how to focus the subject matter. *John William Crossland*

30 Do life studies I usually grab a lamp and some fruit and do some Photoshop studies to help improve my rendering. It is also a nice cost-effective way of improving your overall drawing and sculpting ability. *John William Crossland*

31 Light as you work When I had my dragon (Glaurung) almost modelled I built the scene using proxies, which let me test and fix many things on the go, including various lighting setups, different arrangements of the objects in the scene, and the way maps like Displacements, Bumps, Specular and so on, behaved. This also saved me a lot of time and allowed me to play with the composition until I found something I liked. *Francesc Camós*

32 Keep it simple Generally, two lights are enough to light up a character. I use my HDRI as well as a fill light. *Tiago Rios*

33 Use it to good effect Light should emphasise the shape of the object to make it more expressive and to create an interesting reflection, which creates the right mood. *Dmitry Cheremisin*

34 Keep light neutral for test renders Use the neutral lighting for test renders and when you set up shaders or correct textures. It will avoid the influence of light source colour on the textures and set the correct parameters to the shaders. *Dmitry Cheremisin*

35 Use ZBrush's LightCap tool I always create the basic lighting from a simple photograph using the ZBrush environment texture>LightCaps tool. As long as the image has the necessary colour scheme, the tool automatically creates eight lights with simple settings that I can then start to edit. It makes my pipeline faster and sometimes gives me new lighting ideas. *Laura Peltomäki*

36 Opt for KeyShot KeyShot is a very easy program to use and it is very robust. After setting up the shaders, lighting and camera, you just hit Render. For the materials in my project, I've used one of the skin materials available in KeyShot. *Ovidiu Enache*

37 Render a Specular lighting pass A quick way to add realism to organic forms such as teeth and eyes is to render out a Specular lighting pass, which can be layered on top of the main render to highlight to the image. This is also great for creating the look of slime or saliva. *James Suret*

38 Create your own HDRIs Lighting can be really fast in KeyShot. In my project, I've used a custom HDRI made with the KeyShot built-in editor and a few physical lights. *Ovidiu Enache*

39 Break down the scene One of the most helpful things in rendering in my experience is to break down the scene into different elements and render passes. If you try to push everything into one render you might end up having problems but if you rely on passes and try to put them together later you will have more control and better quality in the end. *Arda Koyuncu*

40 Check render passes for noise Check the render pass after a test render to find out which passes contain noise. For example, if the lighting pass is noisy, then you need to increase the number of samples for light sources; if the Reflect pass contains a lot of noise, you need to increase the number of samples in the reflect parameter of the shader. You can quickly find the source of the noise in the image and get rid of it. *Dmitry Cheremisin*

41 Optimise your render Where possible, use instances with identical geometries. Remove from the scene all that is not visible in the camera. Convert the textures into the native formats of the engine render (EXR for V-Ray, TX for Arnold and TEX for RenderMan). Do not overdo it with anti-aliasing if you do not need it. *Giovanni Dossena*

42 Leave the image effects for postproduction It's better to leave image effects, such as depth of field, glow, vignetting and chromatic aberrations for postprocessing. You can spend a lot of time trying to configure all these settings when rendering. *Dmitry Cheremisin*

43 Think about composition Composition is extremely important when creating the final illustration. To create an appealing and interesting image you should be aware of Rule of Thirds and the golden ratio. Simply search Google Images for 'golden ratio', overlay one of those images on top of your render and see if the main focus of your render fits in the centre of the spiral or close to it. You may have to try several camera angles or render sizes to create the right composition. *James Suret*

44 Don't render hundreds of layers I've had some bad experiences with rendering, so I've learnt to make everything simple. I recommend using as few layers as possible. Three years ago I created a design for a pitch – I ended up with 120 layers for the first image. The client liked it, so they asked for more. It is no fun duplicating 120 layers for five more images. *Nuttavut Baiphowongse*

Build a fantasy city

Anthony Eftekhari

Fabio Zungrone

We speak to Anthony Eftekhari and Fabio Zungrone, creators of The Matte Department, to find out how to build a fantasy city in 3D

Do you have any general advice for modelling a fantasy scene?
On a scene this big, the amount of modelling can be discouraging. Planning ahead will really help you to save time. We noticed from some photo reference that most of the buildings had a very similar structure – what made them different were objects on the roof (barrels, tables and so on), textures and elements like doors and windows. Once we had that figured out, we blocked in several different building shapes. We then modelled different doors and windows to create various facades that would change the look of the buildings. From there we added set dressing to the buildings to provide yet another look variant. By mixing all these elements we were able to create a variety of buildings without having to spend months modelling each single one.

How did you go about texturing?
Since we had a lot of assets in the shot and a limited amount of time to complete it, we tried to be as efficient as possible in the texturing. We box-mapped almost all the assets, painting different brick maps as textures. We did this knowing that the assets will not be right in camera and never close up. Like the modelling stage, it is important to texture with the camera in mind. If the asset is really far away from camera, then we don't need to spend a lot of time texturing every little piece with superaccurate UVs.

How did you create such a realistic lighting setup?
Lighting was one of the most important aspects for us. We wanted to create a believable environment, so getting the right light was crucial. We used an HDRI map for the environment light and a VRayLight for the Sun. A setup like this works almost every time; it's effective and quick to adjust to get different light scenarios. Before you start lighting, it's important to do your research and find photo reference of the lighting you want in your shot. In the research you'll find essential elements of realistic lighting like values, colour, atmosphere and contrasts. All this information is what makes your scene look believable and real, and your reference is what will get you there.

What postproduction tips can you give us?
We used NUKE for our final composite. One of the ways to make large scenes feel epic is to add atmosphere. Looking at reference images, we found this to be the biggest visual cue for scale and sheer size of environment. We used the V-Ray Atmosphere pass to give us the depth we needed. This pass essentially adds fog to your scene. That fog pass can be dust, pollution or just simply perspective. We also used the Z-Depth pass to push and pull that fog pass or to add more in certain areas to create edge contrast and readability.

Postproduction

45 Render materials and passes Render different materials and light passes in either ZBrush or KeyShot, then comp them together in Photoshop. Use different Photoshop layer modes, such as Screen, Multiply, Overlay or Soft Light to find a nice image composition. *Ruben Alvarez*

46 Use photo textures You can very easily enhance the texture/painting of your 3D rendered model by cutting out portions of photos, laying them on top of the render and changing the opacity of the layer. Using the Clone tool you can then sample the layer and paint the area of the character where you want the texture to appear. *James Suret*

47 Improve the image Create a mood in your work by adding some smoke or particles (lens flare effects are more than welcome). Add a noise filter and a Lens Correction filter with some chromatic aberration, but don't go too overboard on this. Photoshop's High Pass filter is also nice to make your image pop. *Ruben Alvarez*

48 Adjust the settings The majority of lighting definition comes in the postprocess stage, where I change exposure values and edit each render pass from the final render. This process is closer to changing values, such as the aperture or shutter speed on a camera when taking a picture, rather than playing with light values. Granted, while you can change these options inside Maya on the virtual cameras, I prefer to explicitly edit the render passes in Photoshop. *Joshua Haun*

49 Include depth of field Depth of field is very important to create the atmosphere and direct the viewer's eye to the right place. You can manually blur out the background of your render in Photoshop. Alternatively you can render out a Depth pass in ZBrush and use that as a mask in Photoshop for blurring. *James Suret*

50 Always perform colour correction It is always possible to slightly improve the result of rendering with colour correction. For example, you can make the glare a bit 'colder', and the shadows a little 'warmer' or vice versa. Also you can enhance the contrast and get rid of the boring 'grey tones'. This will make your image more expressive. I use Curves and Selective Color for this task in Photoshop. The main thing with colour correction is to not overdo it. *Dmitry Cheremisin*

Forest maiden by Laura Peltomäki

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Technique focus

Incredible 3D artists take us behind their artwork

CONCEPT My goal was to work on the creature's concept with this piece, giving it some intelligence and a conscience that we could see through its eyes. I've enjoyed working on the textures for this image a lot as they required very high levels of detail.

Jonathan Provoost
bit.ly/1fjbPgC

Jonathan studied the arts before specialising in 3D graphics at the Bellecour École in France

Software ZBrush, KeyShot, Photoshop

Aquatic Creature, 2015

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The Pipeline

Expert advice from industry professionals, taking you from concept to completion

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

"When you're happy with the overall shape you can start using the Slash brush to define the different plates, seams and cuts"

JONATHAN BENAÏNOUS
Sci-Fi Helmet, 2015

Software

ZBrush, Maya, Photoshop

Learn how to

- Sketch your concept directly in ZBrush
- Create nice and clean topology in Maya
- Generate Alphas in ZBrush, using Maya and Photoshop
- Detail your hard surface model at an expert level
- Render your different PBR and lighting passes in ZBrush
- Generate a final picture using render passes in Photoshop

Concept

I aimed to create a hyperrealistic and well-polished sci-fi helmet with a distinctive style, drawing reference from a number of sci-fi inspirations.

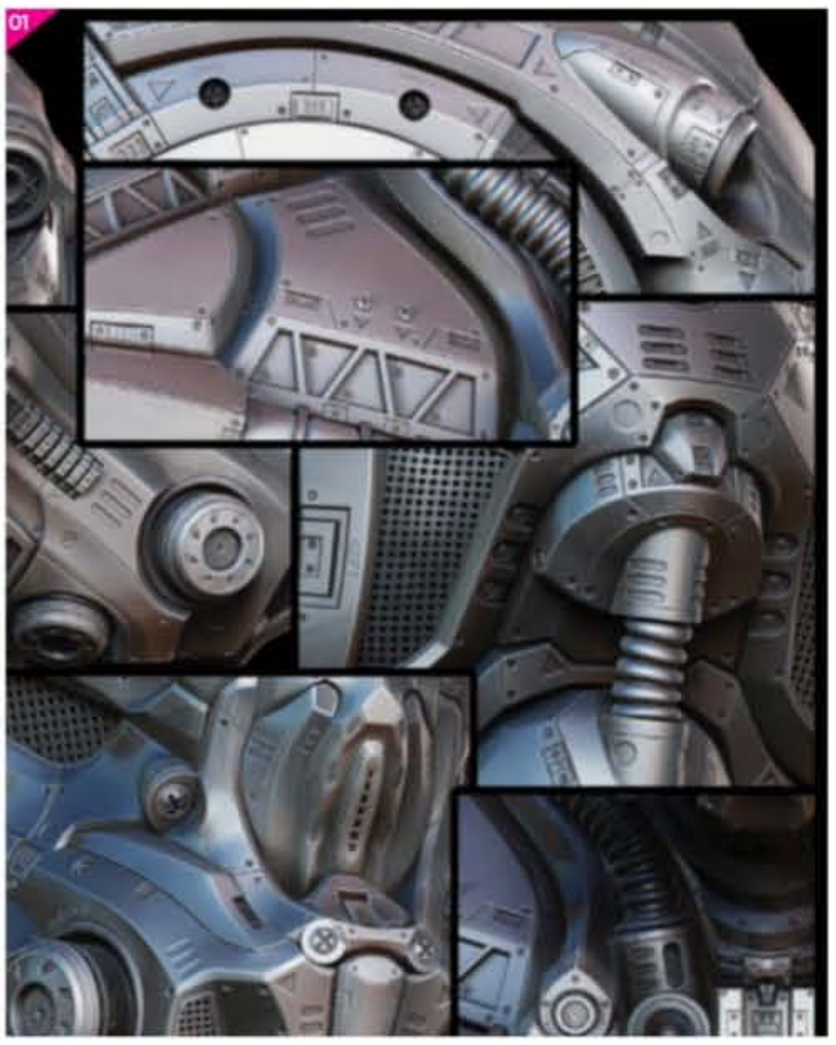
Design a hard surface helmet in ZBrush

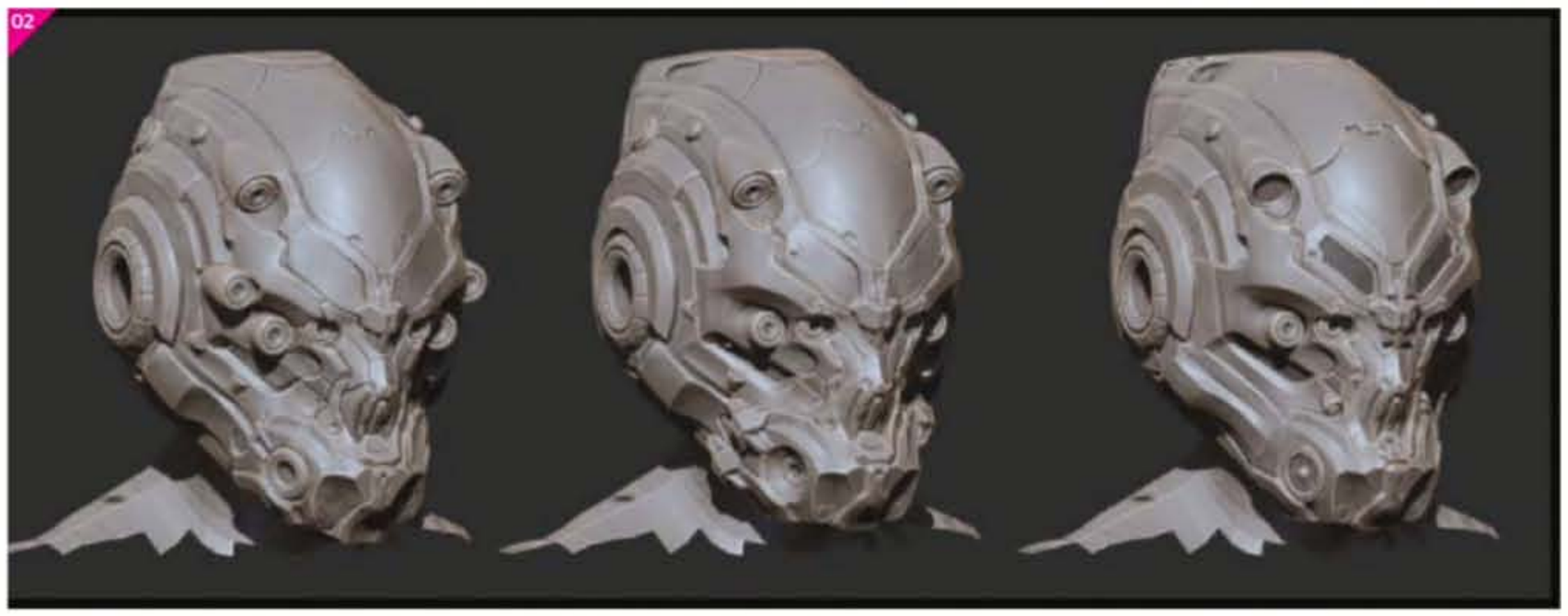
Discover and learn the entire creation process of a very high detailed sci-fi helmet, from the ZBrush concept to the final picture

Over the next few pages we will explain how to go through the different steps of production of a very detailed hard surface helmet such as this one. At face value, the final image may seem discouraging to some readers as it exhibits a high level of detail and polish. However, in this tutorial, we will attempt to extract the method, techniques and tricks that will assist you in reaching this high level of render quality. It is fundamental for you to be aware of your own capacity as an artist, and to be very critical of your own work at the same time. The more you demand of your own work and the harder you push yourself, the more you will end up developing your skills. We will also learn how to take advantage of powerful pieces of software such as ZBrush, Maya and Photoshop. We will show you how to sketch your concept directly in ZBrush, and how to use Maya to clean and refine your ZBrush model. Finally you will also learn how to use your PBR render and ZBrush to make a final composited image in Photoshop.

01 Find inspiration The first step is to find a number of references to help inspire your creation. This is a very important step in the process of producing an asset such as this. The references you find will aid you in determining the direction of your style. Take a good amount of time to analyse all of your references in detail, to absorb and identify the elements you would like to have on your future model (eyes, ears, jaw, sensors and so on). This step is the foundation of your project and the most crucial part. Your work here is going to directly impact your final result, so make sure you are happy with your defined style and have found adequate references before progressing.

02 Sketch the helmet Using a basic head as a guide will give you a great starting point. Append a sphere around the head, then once converted as DynaMesh, start searching for interesting shapes using the Move brush. Use the ClipCurve brush to get sharp slices and curves on your silhouette. When you're happy with the overall shape you can start using the Slash brush to define the different plates, seams and cuts on your model. Use the TrimDynamic and the hPolish to clean the different surfaces. Try to keep from having too much blobbiness in the mesh and to keep enough definition between the individual pieces.





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03 Sketch the neck and shoulders

Once you are satisfied with your resulting sketch, use the Lasso selection tool to isolate pieces and split them into different SubTools. To give a thickness to each piece, be sure to have one single Polygroup by SubTool. Then, in the Deformation subpalette use the Polish By Groups slider to clean the border of each piece. Next click on Close Holes, and you should now have a full piece. Select the inside Polygroup and extrude it using the Transpose tool to create the desired thickness. Now you should begin working on the neck and shoulder. You can use an IMM brush to insert tubes and pipes if necessary.

04 Refine all of the pieces

Use the TrimDynamic, the hPolish and also the ClipCurve tool again to clean and refine the SubTools as much as possible. Make sure you spend some time cleaning the thickness and the inside, assuring they have sharp and clean edges. Adjust the SubTools with the Transpose tool to create nice rhythm and variation between the pieces. Try to alternate the height of plates, make sure to readjust the connection between all the shapes using the Move brush if necessary. Remember to use this brush carefully and with a larger radius to avoid deterioration in your refining work.

Open or closed version

In our case we are currently creating a functional helmet but in a closed version. Of course, even if the model is going to stay closed, it is very important to make it believable. You should remember to keep some space between the face and the helmet if you are planning on creating an inside or an opened version. Use the transparency combined with Ghost mode to adjust the helmet with greater precision. It's also very important to hide and unhide some SubTools to check if the eyes, nose, mouth and ears are in the right place.

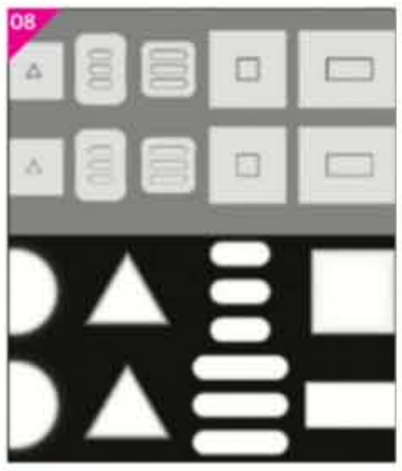
05 Retopo in Maya

In the Zscript menu use Decimation Master to decimate each of the SubTools. Try to have a good balance between the shape definition and the poly count to be able to import your model in Maya. Once in Maya you can use the Quad Draw tool to retopologise each element. Try to keep your topology as homogeneous as possible. In this manner you will have the same definition in ZBrush as when you increase the levels of subdivision. Use the Crease tool on each edge that you want to keep as a hard edge. This will generate a bevel on your creased edges. Previsualise the result using keys 1 and 3 to fix any issues properly.

06 Transfer with GoZ

Use GoZ to transfer each SubTool from Maya to ZBrush. We are using this method because it keeps your crease information (that we got from Maya) for subdividing SubTools without losing hard edges. This process lets you find the perfect balance between sharp and soft edges. You can also play with the Crease Level slider in ZBrush to see if you want to keep the crease information or not when subdividing. Ensure you correctly merge all your vertices in Maya to avoid holes being created when you subdivide.

07 DynaMesh and merge your elements Before converting each SubTool in DynaMesh, start to delete the lower level of subdivision by clicking on the Del Lower button in the Subdivision tab. Use the Merge button to combine the SubTools you want to fuse and click Cmd/Ctrl+W to create one single Polygroup. Convert your SubTools in DynaMesh and clean your seams, if necessary, by using the Smooth brush. You can also mask the seams and play with the Polish slider in the Deformation subpalette to smooth your intersections in a uniform way to get a seamless result. Don't forget to use the Smooth brush and the hPolish to attenuate some pinch and tension on your surfaces.



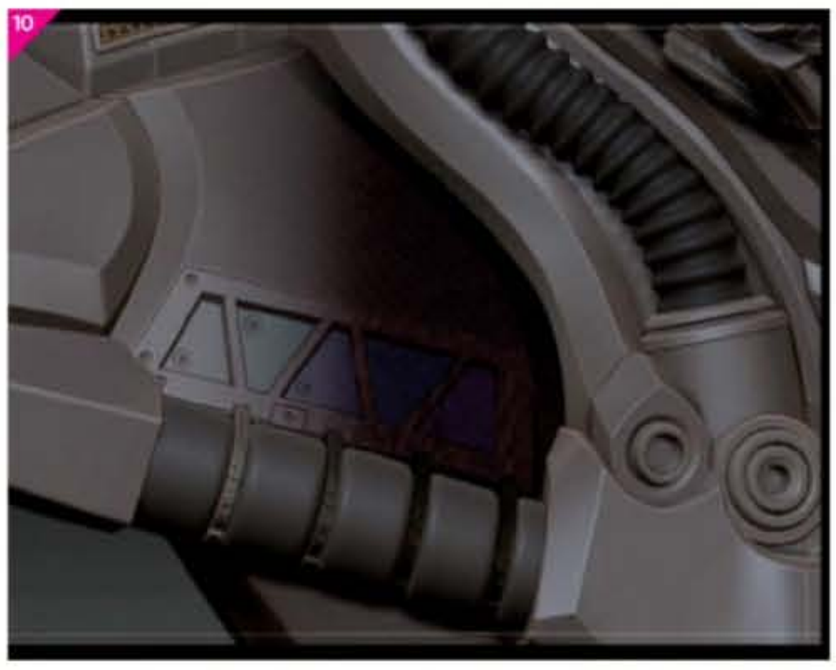
08 Create Alphas using Maya and ZBrush In Maya, begin modelling the shapes you would like to use as Alphas. In our case, we are creating triangles, squares, rectangles, circles and cylinders (or capsules). You can have two different versions, one sharp and one that is much smoother or one that is flatter and another that is deeper. Don't forget to keep a flat surface around your shape to avoid any cuts when you convert your shape into an Alpha in ZBrush. Import your Maya geometry into ZBrush and use the GrabDoc to capture and convert each shape into an Alpha.

09 Create text Alphas using Photoshop In Photoshop, create a 1K squared new document and fill the page with solid black. Then type, in a white colour, some different text with a serial number and if you wish, a logo for the model. You can create a straight and a curved version of the text. As you can see in our screenshot, each text piece is a separate 1K texture. The more angle variations you have, the easier it will be to place your text along curved shapes.

Tips for hard edges

To get the desired result when you are subdividing in ZBrush, play around with the Crease Level slider. Start subdividing four or five times at level 15 to maintain very sharp edges. Then just subdivide again two or three times at level 0 to break the sharpness and this will result in some well-bevelled edges. This trick will enable you to easily adapt the general aspect of your model. It is an essential step towards creating round and soft or really sharp and neat elements.

10 Detail in ZBrush To add details on your surfaces and create a great industrial pattern in ZBrush, use the SliceCurve to slice your SubTools into different Polygroups. Once the outline of your shapes are drawn, use the Transpose tool to extrude, scale and translate your Polygroups. Try to stay consistent with your different pattern and be sure to reuse some of them here and there to ensure that it's homogeneous. Use the Curve Frame Mesh button to generate a spline around your Polygroup's border, then use the CurveMultiTube brush to create nice rubber joints around your shapes.



Showcase

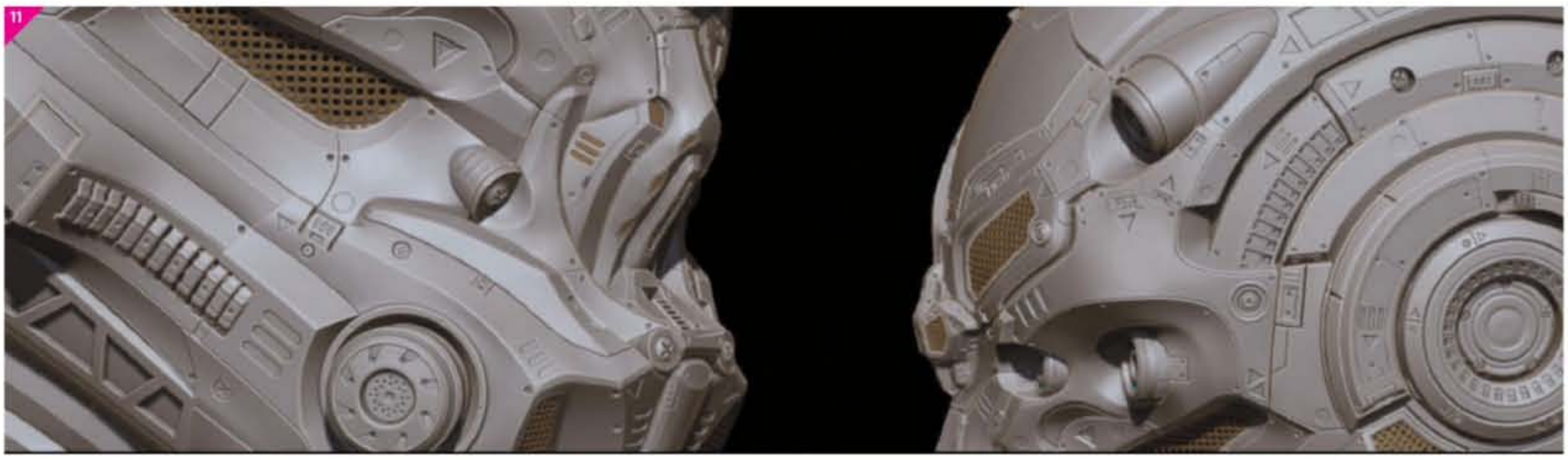
Jonathan Benaïnous

I started in the videogame industry almost ten years ago as a 3D artist and environment artist. I currently work at Ubisoft as a senior environment artist. I have a passion for creating a wide range of images, vehicles, environments and lighting.

Condenser Room / Beyond: Two Souls **Maya, Photoshop (2014)**
For *Beyond: Two Souls* I was in charge of creating this huge Condenser Room, including the modelling, the texturing and also the lighting.

Helicopter / Beyond: Two Souls **ZBrush, Maya, Photoshop (2013)**
For *Beyond: Two Souls* I've created this game asset inspired by the famous Black Hawk.

Eva 01 / Neon Genesis Evangelion Tribute **ZBrush, Maya, Photoshop, DDO (2014)**
One of my personal projects, this is a tribute to the animated Japanese show *Neon Genesis Evangelion*.



11 First and second detail pass To start your first detail pass, use the Standard brush with a small draw size and use a lazy mouse to draw and delimit different plates on your model. The goal here is to underline the existing shapes and add nice lines of detail. Once you're happy with this, start using your custom Alphas from Maya to detail your pieces (switch the focal shift to -100 to avoid any distortion when you apply your Alphas). We suggest implementing the second and first pass together to keep a good balance between lines and patterns. Attempt to have logical positioning of your details to accentuate the realism; referring to previously gathered references here will help.

12 Third detail pass To start this detail pass, disable the symmetry and start using your text Alphas from Photoshop. Use the Drag Rectangle stroke to find interesting places to add your text. Once again don't forget to turn the focal shift to -100. Try to create a different reading level using different sizes of typography, for example smaller texts can be used as serial number on your different pieces while bigger pieces could be used as information for the user of the helmet. Try to imagine someone actually using the helmet and the information they would require.

13 Optimisation for faster renders Use the Decimation Master plugin to decimate all of your SubTools. Then play with the percentage slider to optimise your SubTools and find a good balance between performance and accuracy. Note that you should not notice any differences from the original mesh. Don't be too aggressive with the poly count and spend time testing different settings for a perfect balance.

14 PBR render pass Start by finding a good camera angle in ZBrush. Use ZAppLink to store it, or simply create an animation key on the timeline. The goal here is to have enough diversity in the render pass to be able to generate the type of material you want in Photoshop. The more renders you have, the more you will be able to experiment different settings. The shadows will be rendered one time in the next step and composited directly in the final picture. Don't forget to disable them in your Render Parameters tab to optimise the time of your renders.

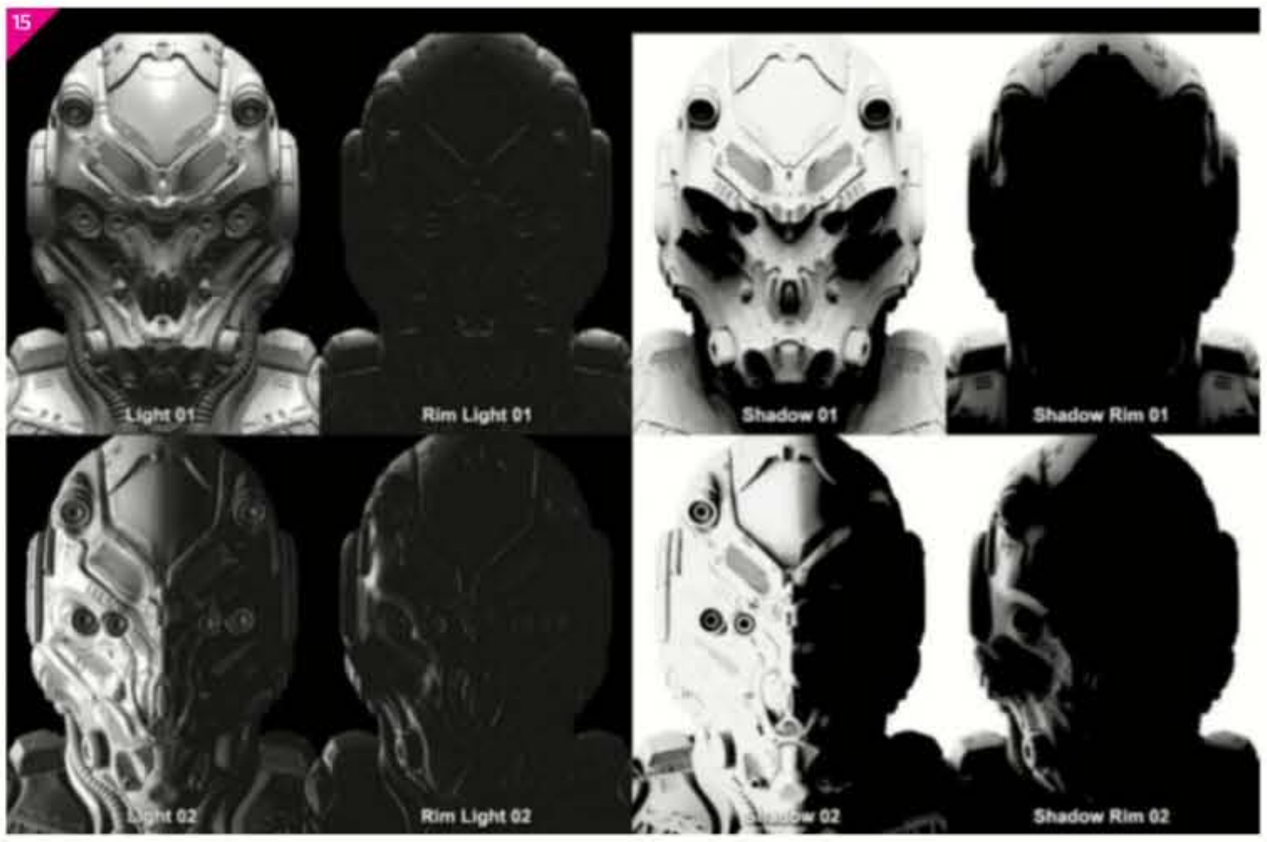
DynaMesh tricks

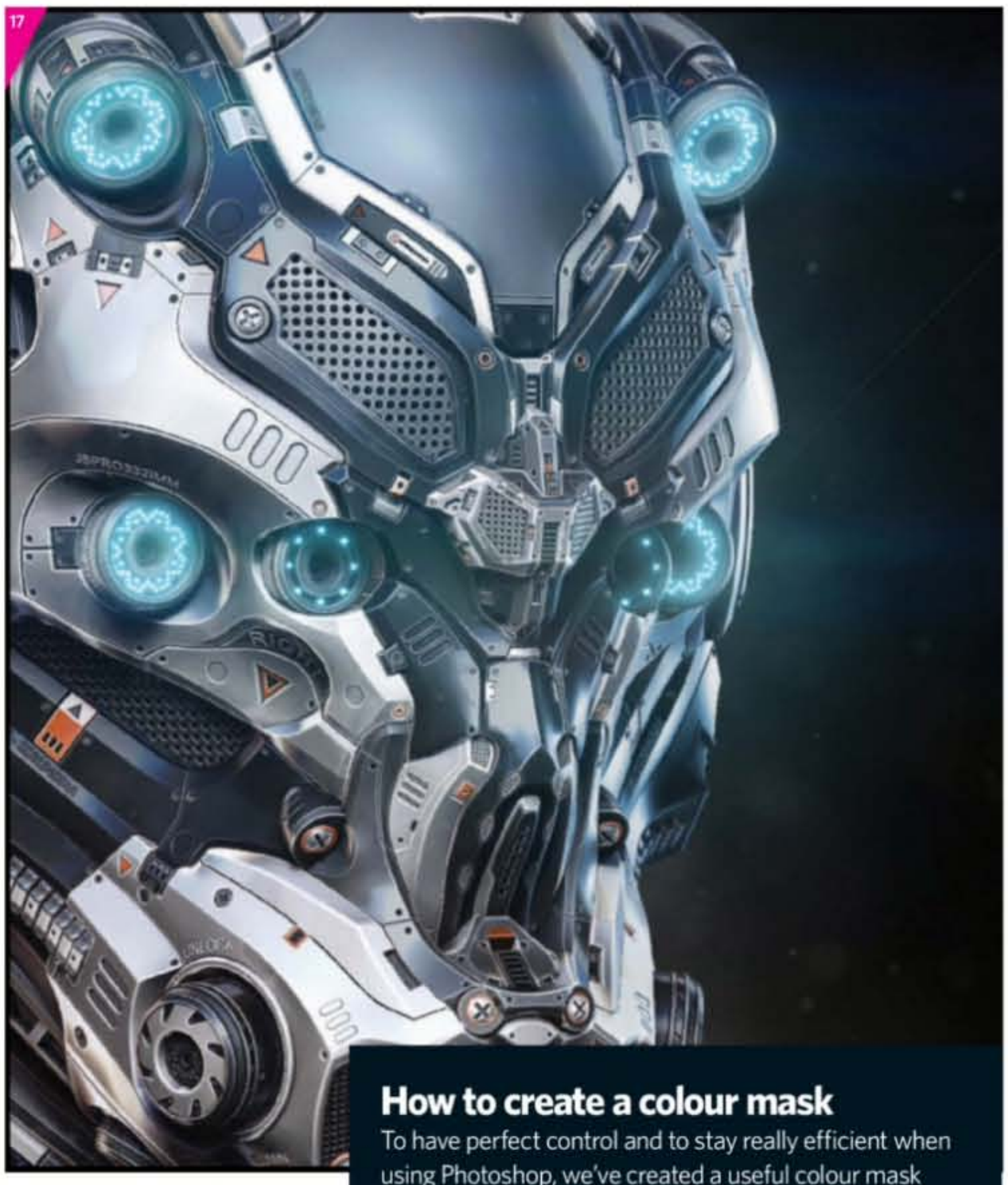
In ZBrush, the definition of your DynaMesh is based on the scale of your object. If you're already DynaMeshing your SubTools in 2,048 and you want to have more definition, you can use this work around: in the Deformation subpalette, use the size slider to upscale the chosen element. Note that we recommend to upscale by 100 and to downscale by -100 to keep the same size ratio. Once the object is DynaMeshed at the desired definition you can downscale it and it will return to its original position.

“Play with [Decimation Master]’s percentage slider to optimise your SubTools and find a good balance between performance and accuracy”

15 PBR lighting pass Create a new light in your Light tab, and push the intensity value to 3 to have a strong directional light. In your BPR Shadow subpalette, increase the level of rays and angles for softened shadows. Once again, find a good setting to have both nice shadows and a decent render time. Make three different lighting passes from the following; the top, the left and the right. Repeat the process to generate three rim lights from the previous angles. Each of those lighting passes will have their own shadow pass, which will allow you to have a tighter control in Photoshop.

16 Compositing in Photoshop Import all your different render passes in Photoshop and stack them into one single image. Rename all your layers to have an organised PSD. Keep the materials together as base and all the lights on top of it. Tweak the blending modes, the opacity slider and add a modifier layer as Hue/Saturation, Level or Brightness/Contrast. To change the colours of your different elements, use a colour mask and the Magic Wand tool to fill in the selection in a new layer. Once again, adjust the Blending mode and the opacity to get a good result. For the micro details use the Lasso and fill the selection with the chosen colour.





17 Special effects To generate a smoke effect in the back, use a black-and-white mask from ZBrush and use a Gaussian blur with a big percentage for a foggy silhouette. Then create a cloud in Photoshop, tweak the levels and the opacity, and then merge the two layers down. You can repeat the same process to slightly add smoke in front of your helmet using a lower opacity. Use a depth-of-field pass to generate a realistic blur based on your camera focal. To add particle effects and lens flare, don't hesitate to use HD stock photos from website like CG Textures (**cgtextures.com**). As a final touch, you can create chromatic aberration by shifting your RGB channels in a different direction. Create a fusion mask on your merged layer and erase the centre of the image to just get a nice effect on the border.

How to create a colour mask

To have perfect control and to stay really efficient when using Photoshop, we've created a useful colour mask using the Nicks Tools plugin. It is a really handy open source ZBrush plugin that can be used in any type of project. Instead of manually filling each SubTool with a different colour, it allows you to do it in one click. You can also enter a value to multiply the grow or shrink selection of a mask. The large list of functionality is amazing and it will greatly help you in certain case. Check it out at: **artofnickmiller.com/resources.html**.

All tutorial files can be downloaded from: **filesilo.co.uk/3dartist**

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> We chose to render the image using OctaneRender for Maya, which is extremely powerful, fast and easy to use

Render a realistic butterfly

Model and texture a photorealistic blue morpho butterfly (Morpho menelaus) and its iridescent wings

This tutorial demonstrates an approach towards creating an accurate, photorealistic image of a real butterfly based on reference material. We will go through the modelling process for the insect in ZBrush 4R7 and demonstrate techniques for creating delicate wings, wrinkles and textures. We chose to render the image using OctaneRender for Maya, which is extremely powerful, fast and easy to use. The main parts of this project are creating delicate wings from single-sided polygon surfaces and creating an Octane shader that shows a different texture based on the normal direction of the polygon faces. Blue morphos have completely different colours on the underside of their wings and we will also demonstrate how to capture the brilliant iridescent quality of the wings using a few special OctaneRender nodes. In addition we show you how to create insect hair with Paint Effects and how to render that hair with Octane. The lighting is based on techniques used by professional macrophotographers.

ERIC KELLER
Blue Morpho, 2015

Software

ZBrush 4R7, MARI, Photoshop, Maya, OctaneRender for Maya

Learn how to

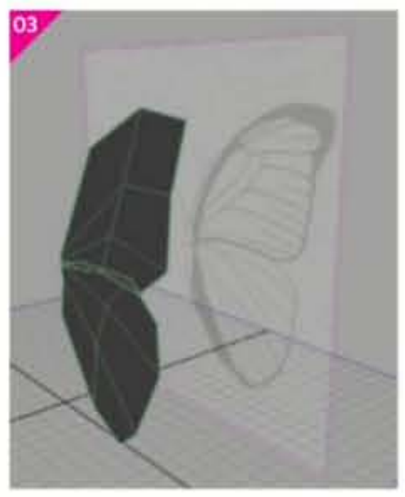
- Model realistic butterfly wings in ZBrush
- Create and export textures in ZBrush
- Create UV textures
- Use coordinates in ZBrush and Maya
- Upgrade textures with MARI
- Create lighting and shading in OctaneRender for Maya
- Create double sided shaders in OctaneRender
- Render Maya Paint Effects in OctaneRender
- Render a realistic image using OctaneRender

Concept

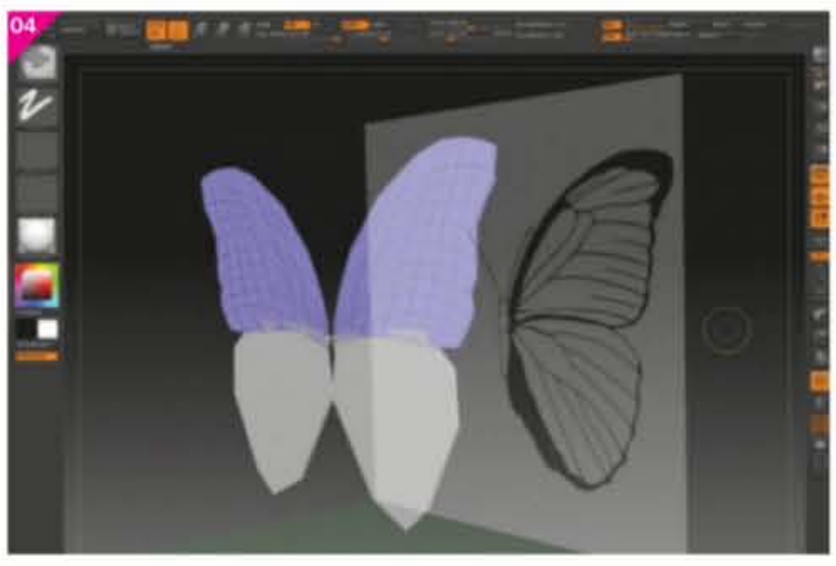
I used a Morpho menelaus specimen ordered from a butterfly website as reference. I photographed the specimen and also scanned the wings ensuring my model is as accurate as possible.

01 Obtain butterfly references Any attempt to create a realistic image of an animal has to start with gathering reference. Internet searches are pretty good but images posted online are often mislabelled. The great thing about insects is that obtaining the real thing is easy. If you can afford it, order specimens of the species you want to model from a place like Butterflies and Things (**butterfliesandthings.com**). Have a specific idea in mind of what species you want to model. For this tutorial we'll be using Morpho menelaus.

02 Create a reference image Butterflies are all about wings so you will want to make sure that the vein pattern is correct (don't just make it up!). Scan the wings using a flatbed scanner – this may mean you'll need to remove the wings from the butterfly to do so. Morpho menelaus has completely different patterns on each side of the wing. The topside is blue and the bottom is brown with spots. Scan both sides and then trace the vein pattern in Photoshop. Create a square image that clearly shows the pattern; you'll use this in Maya and ZBrush as a guide.



03 Create low-poly wings in Maya Start by making a rough model in Maya to establish scale even if most of the modelling will be done in ZBrush. Shape a polyPlane so that it roughly matches the shape of the wings and the vein pattern. You only need to create a forewing and a hindwing for one side of the butterfly since the wing can be symmetrically duplicated in ZBrush.



Approaches to wing modelling

Single-sided polygon surfaces are the best way to ensure your model's wings appear delicate in the final render. However since you will be sculpting the wing in ZBrush you'll want to use a surface that has thickness. ZBrush sculpting brushes do not work well with single-sided surfaces. You'll need to extrude the wings before sculpting them in ZBrush and then later on, when the wing is near completion, delete the extruded surface before importing back into Maya. To make this process easier, model the wings so that there is a face path running along the outer edge of the wing.

04 Import the model into ZBrush Import the wings into ZBrush 4R7 as well as the reference image. Use Auto Groups to separate the wings into Polygroups and then use Group Split to create separate SubTools for the forewing and hindwing. Apply the reference image to the back of the grid so that you can match the reference. Use Mirror and Weld to duplicate the wings symmetrically. Avoid using DynaMesh or ZRemesher or any process that alters the topology. Subdivide the wings so that you have enough polygons to support the detail. Six levels of subdivisions with around 3 million points at the highest subdivision should work well enough.

05 Sculpt wrinkles The approach to sculpting butterfly wings is very similar to sculpting clothing or drapery. You want to create the impression that the wing membrane is stretched between the wing veins. Start by using the Move brush to stretch the subdivided wings so that they match the reference. Use the Dam_Standard brush to draw in the wing veins. Don't worry about the back side of the wings, those faces will be deleted. For the finer wrinkles, alternate using the Dam_Standard brush in Zsub and Zadd mode, then lightly smooth the strokes. A lazy mouse will help you keep the wrinkles straight.

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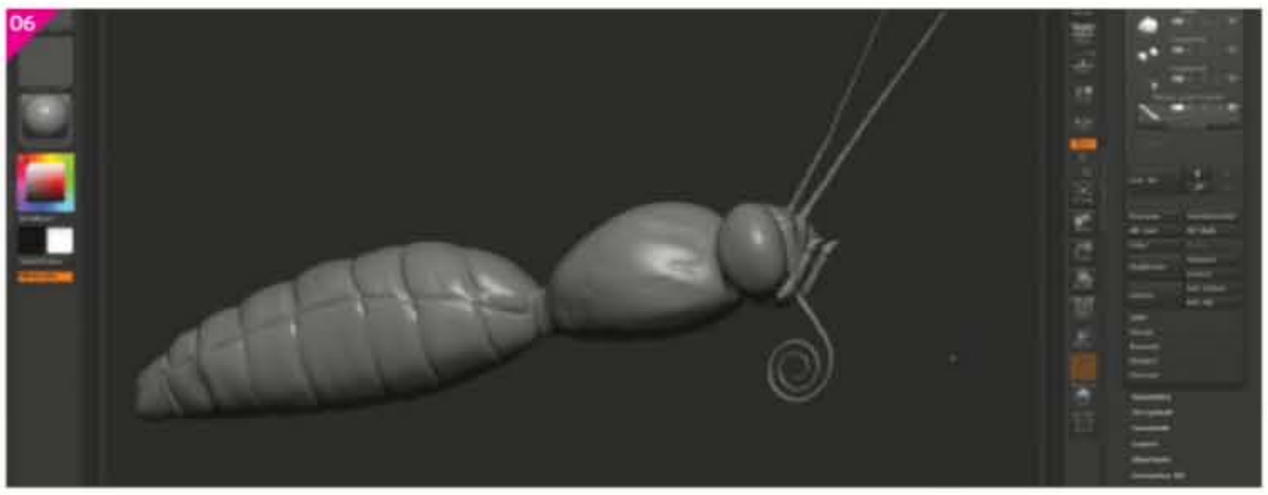
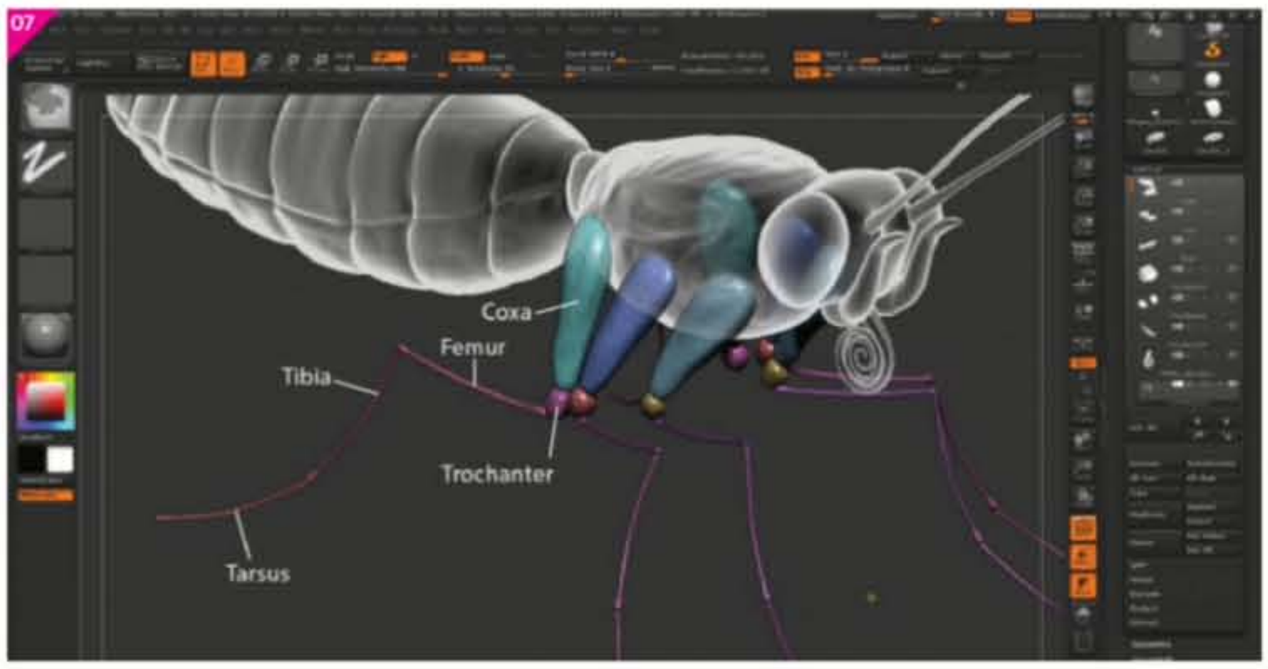
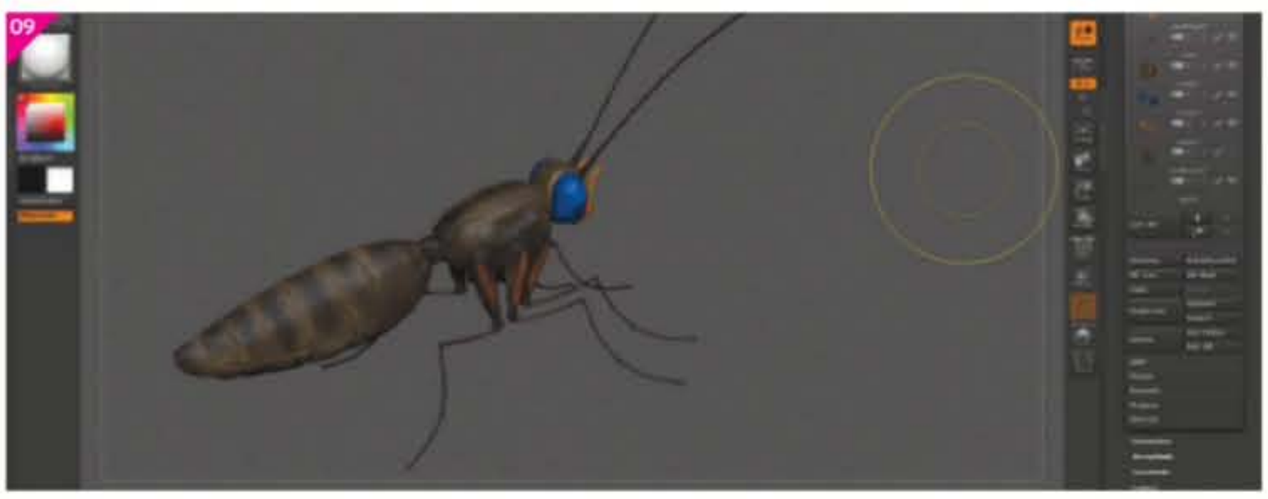


06 Model the body Append the polysurface star model, and use the settings in the Initialize palette to establish the body parts as primitives. For the antenna, you can use the Curve line brush to make long, thin cylinders, and then shape them with the Move and Smooth brushes. Create the segments using the Dam_Standard Brush. Don't go overboard with detail since the surface will be covered in fur, but pay close attention to the number of segments in the abdomen and how they overlap. These segments can be drawn with the Dam_ Standard brush. The proboscis is modelled using the Helix3D primitive and the Move brush.

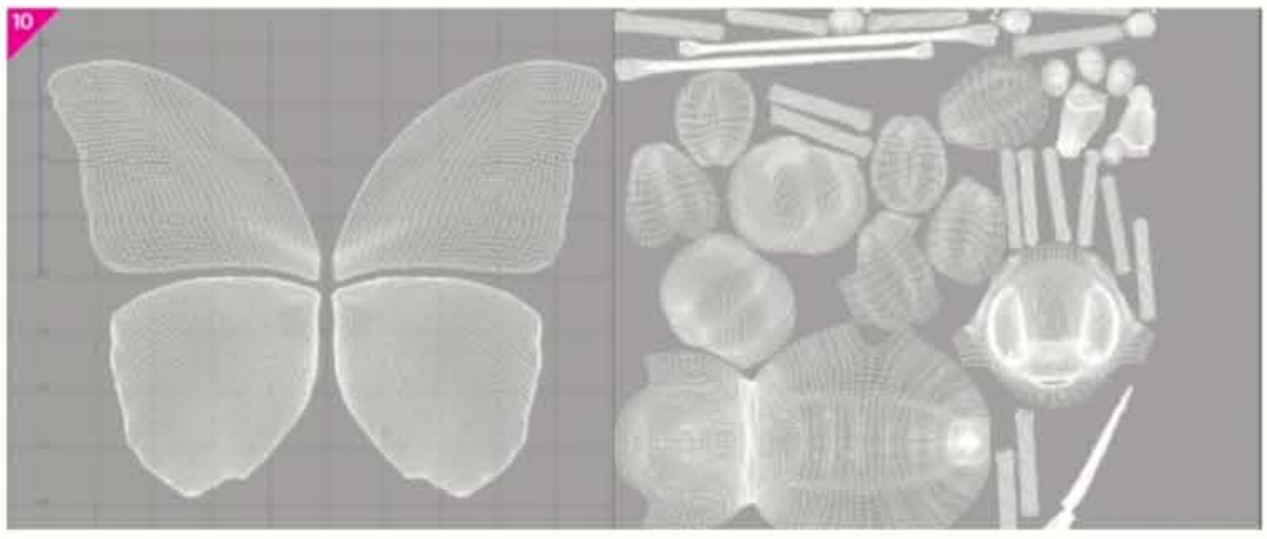


07 Model the legs Model a pair of legs using primitives. Pay close attention to the number of parts of the leg as each leg is made up of five major segments. The coxa is the largest part that attaches to the thorax. The thinner segments are the trochanter, femur, tibia and the tarsus. Once you have created one pair of legs, duplicate the SubTool twice and position them. You should have six legs in all.

08 Polypaint the wings Create two versions of the texture maps for each pair of wings: a blue version for the top part of the wing and a brown version for the bottom. Delete the extruded wing polygon faces and then duplicate each pair of wings. Use the Standard and Smooth brushes with RGB turned on and Zadd/Zsub turned off. Activate Polypaint by turning on the paint brush icon in the SubTool palette. Then establish a base coat colour for each pair of wings and paint details on the base coats. For the brown sides, pay close attention to the location of the 'eye spots'. Add the bright orange and pink colours that make up the design.



09 Polypaint the body The body is mostly dark brown and black with some bright orange spots. Use cavity masking and fill with black to bring out the details. Paint the eyes based on your reference images; some morphos have dull coloured eyes, some have bright blue eyes. Paint lightly speckled dots to create an organic feel to the colour. Add colour to the head, antennae, proboscis and legs. The coxa have bright orange spots on them as well.



10 Generate texture maps Use the UV Master plugin to create UVs for each SubTool. Export the SubTools at the lowest subdivision level and import into Maya, and edit and lay out UVs in the UV Texture Editor. Place the UV shells for the wings in the 0 to 1 area, lay out the UV shells for everything else in the 1 to 2 range, and export as OBJs. In ZBrush, store a Morph Target for each SubTool and import the edited OBJs into them to import new UVs. Use the Multi Map Exporter Plugin to create Texture and Normal maps for the SubTools. Turn on SubTools and Merge maps.

Upgrade textures in MARI or Photshop

Textures created with Polypaint can always be improved in MARI or Photoshop – MARI has very powerful brushes and a nice layer editing interface. Import the OBJs into MARI and paint fine details on a separate layer with the Blend mode set to Multiply. Design a brush that creates the look of the tiny scales that coat the butterflies wings. Taking the time to improve the textures outside of ZBrush will make the wings look better in extreme close-up shots. You can use the same detail layer over both the blue and brown versions of the wing textures.

Showcase

Eric Keller

I have been a professional CG artist for five years. I work on projects for the entertainment industry and scientific visualisation and I teach at the Gnomon School of Visual Effects in Hollywood. I recently launched an online web series called Entomology Animated that uses CG to explain insect physiology.

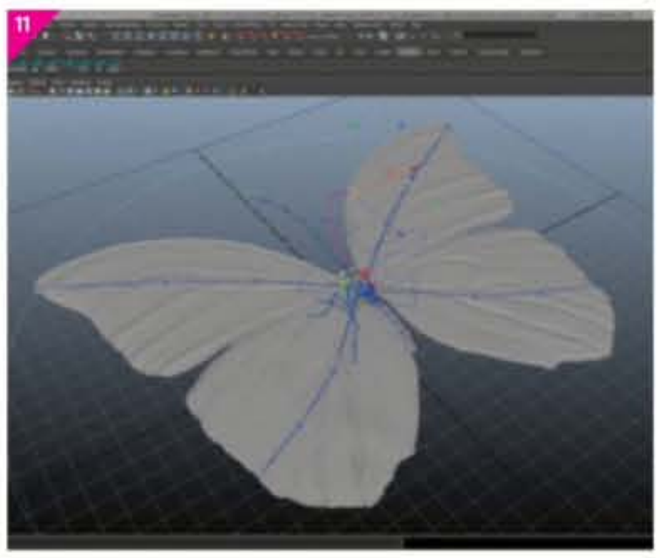
Solenopsis invicta **ZBrush, MARI, Maya, OctaneRender (2015)**
The dreaded fire ant Solenopsis invicta.

Peacock Jumping Spider **ZBrush, Maya, mental ray, NUKE (2015)**
A test render from an animation study of the peacock jumping spider.

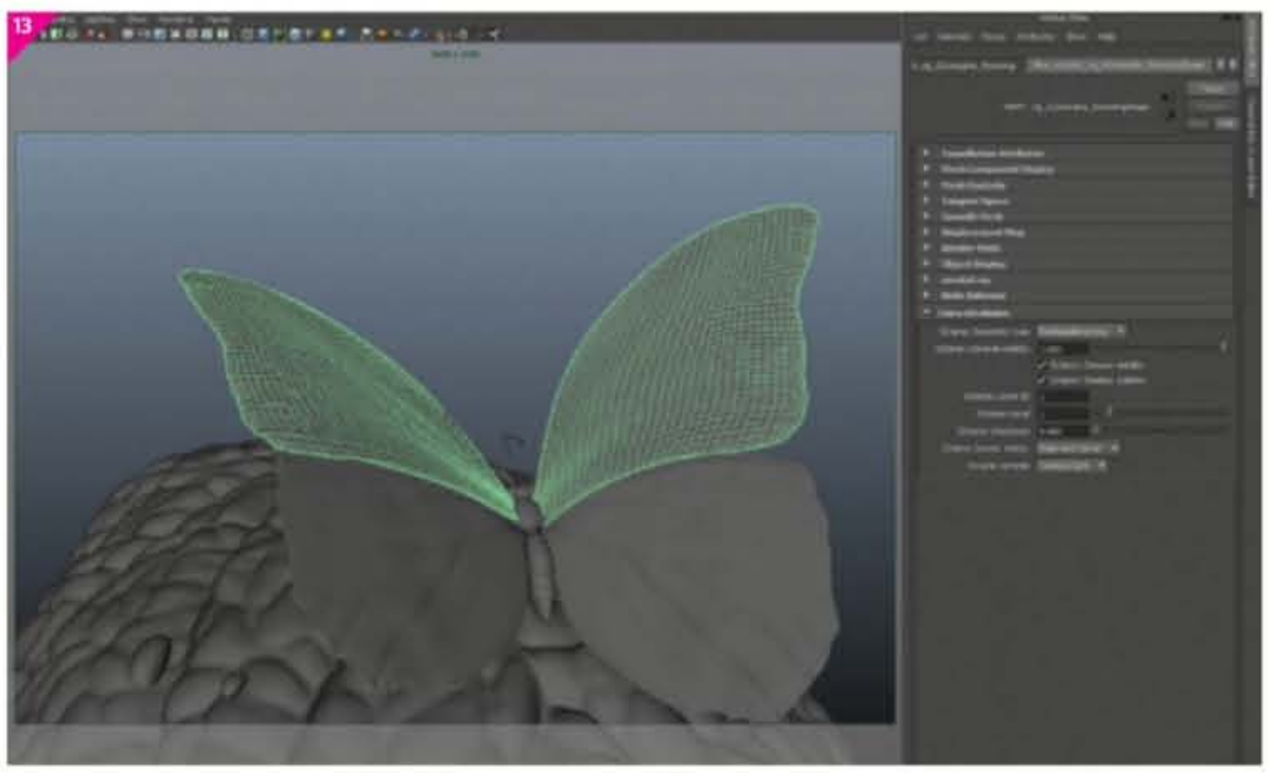
Gasteracantha hasselti **ZBrush, MARI, Maya (2015)**
One of my favorite spiders known as Hasselt's spiny spider, rendered in real-time in Maya Viewport 2.0.

11 Import and rig the model Create a new scene in Maya and import the SubTools with the proper UV texture coordinates as OBJ files. Use the Joint tool to create a simple rig – nothing fancy, just enough to enable you to pose the model, especially the wings. Once the geometry is bound to the rig use a Paint Effects brush to add hair to the surface. The short arm hair preset will work well for insect hair. There's no need to convert the Paint Effects into polygons, the OctaneRender plugin renders Paint Effects just fine.

12 Create props for scenery Create a leaf model for the butterfly to perch on. For best results, use ZBrush to model the leaf similar to how you modelled the butterfly wings. The end result should be a single-sided polygon surface with UV texture coordinates and polypainted textures. Place the leaf under the butterfly and then pose the legs and wings using your simple joint rig. Next, create a new camera and design a composition that highlights the beauty of the wings.



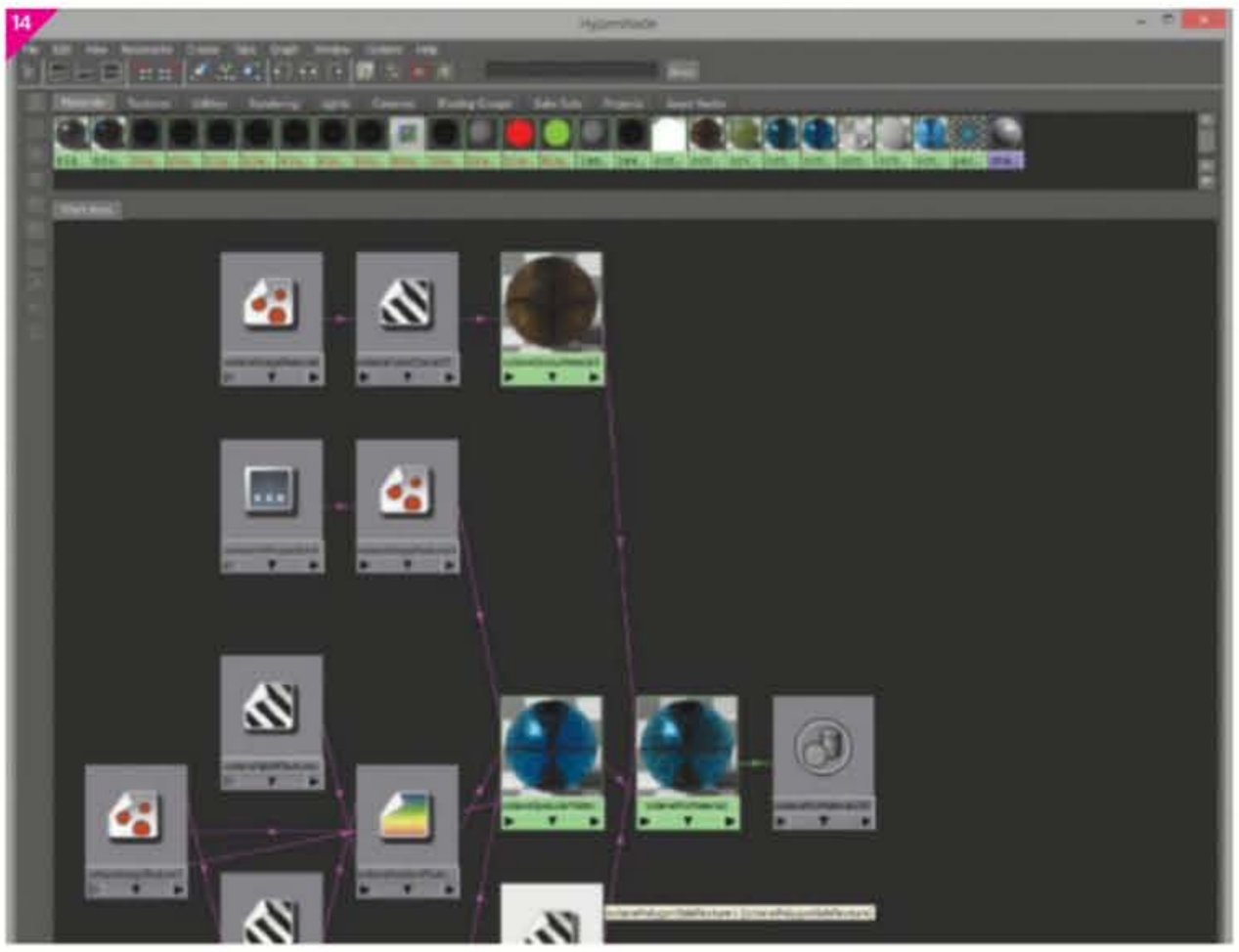
13 Prepare for rendering with OctaneRender Load OctaneRender for Maya and make sure your CUDA graphics card(s) is enabled. Select each piece of geometry and set the Octane Geometry type to Reshapable Proxy. Now set Octane Level to 1, and this will subdivide the model when we come to rendering to create a smoother surface. Add an Octane Sun/Sky environment node. Then, in the OctaneSunSky attributes, set the type to Texture environment. Add an Octane Image texture – for best results use a spherical outdoor HDRI image of a forest environment. Lastly, add an Octane SphericalProjection node to the Projection slot.



Imitate macrophotography lighting

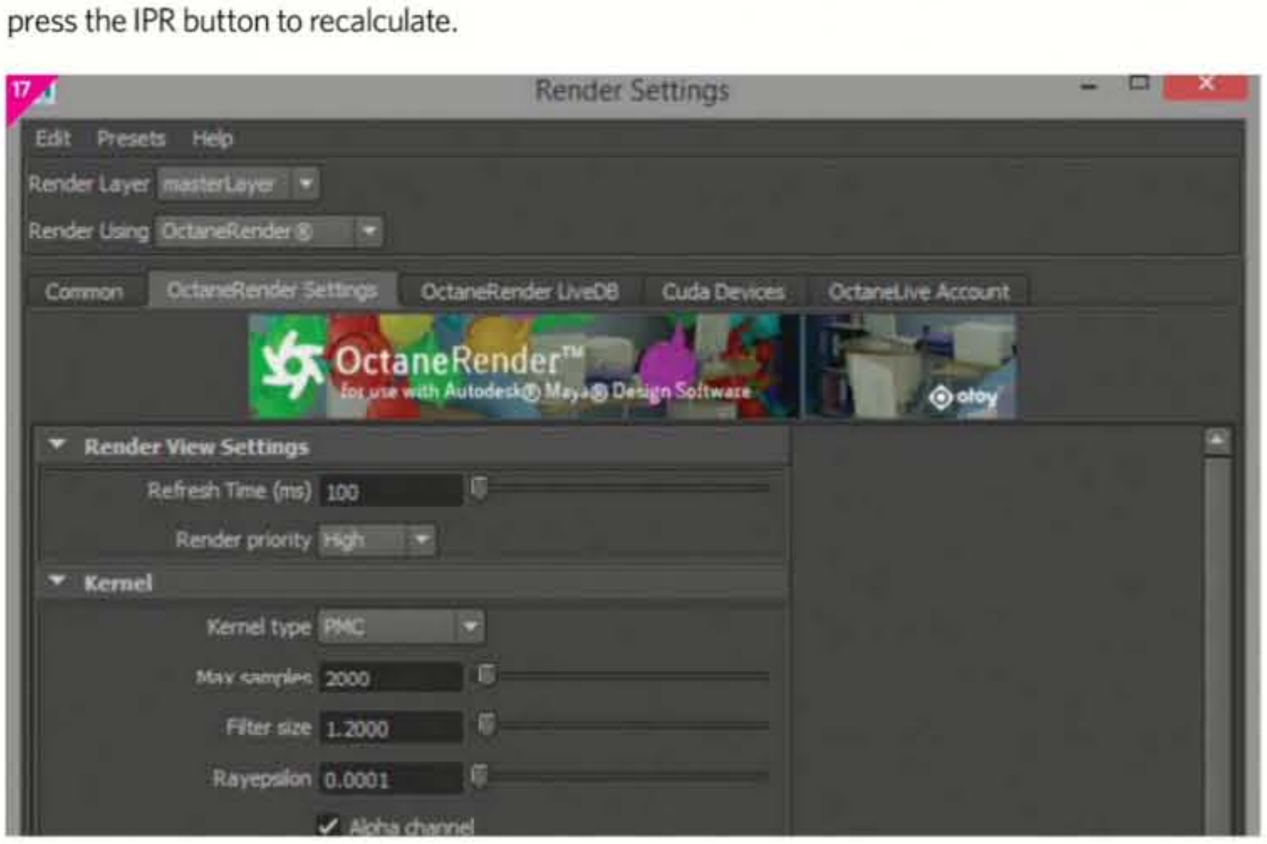
Macrophotographers use flashes on their camera to increase detail and minimise blur. To reduce harsh glare they add a diffuser in front of the flash; we will imitate this with a large polygon plane. Add an Octane Diffuse Material to the plane and add an HDR image of a lightbox to the Emission channel of the material. Increase the Power of the texture and position the plane above the subject but out of view of the camera. Make sure the normal of the plane is facing the subject you want to light!

> To reduce harsh glare [macrophotographers] add a diffuser in front of the flash. We will imitate this with a large polygon plane

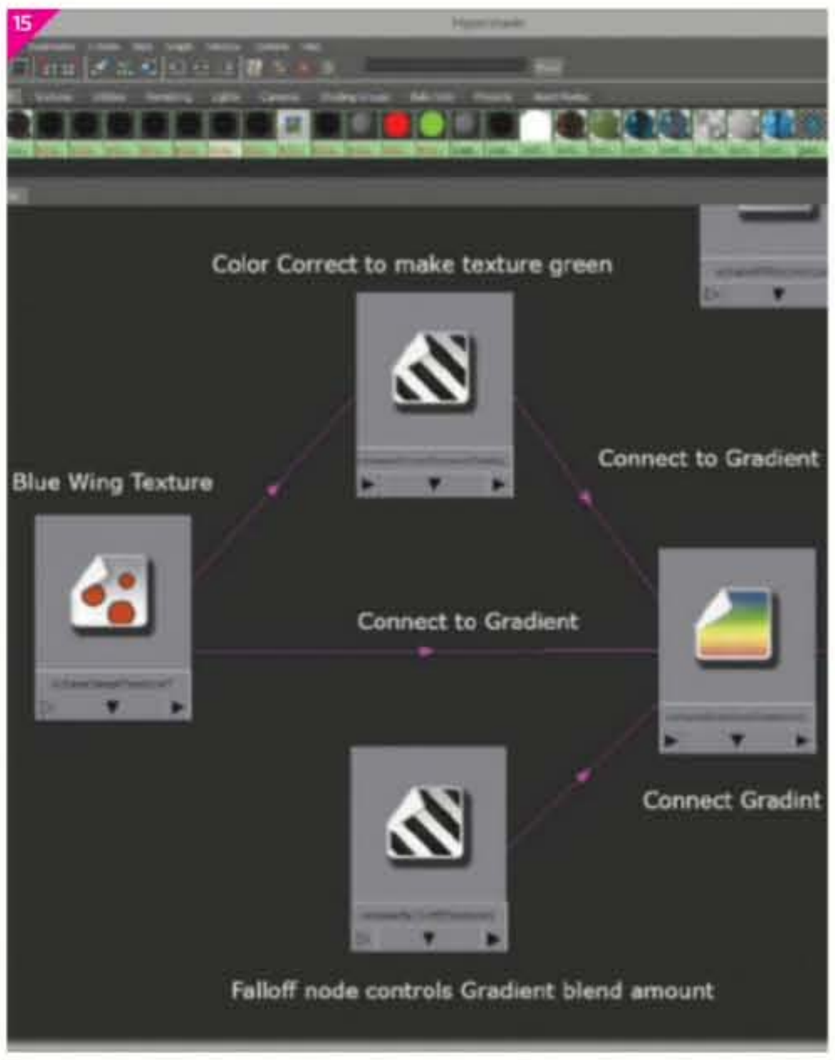


14 Create wing materials Create an Octane Mix Material and apply it to the wings. Add a Specular Material for slot 1 and a Glossy Material for slot 2. Attach an Octane Polygon Side Material to the Amount slot. This means that the top of the wings get the Specular Material and the bottom of the wings get the Glossy Material. Apply a Glossy Material to the body. For each material bring in the Texture and Normal maps. OctaneRender prefers a Normal map with a flipped Green channel. You can use Photoshop to invert the green channel for all Normal maps.

15 Make the wings shine The top of the morpho's wings reflect different hues based on viewing angle. Create this effect by adding a Mix Texture to the reflection channel of the Specular Material. Next, add an Octane Falloff Texture to the Amount slot, add the blue texture map to the Texture 1 and add a Color Correct Texture to Texture 2. Hook the blue wing texture to the Texture channel of the Color Correct node and adjust the hue correction to -.557 to make it green. Create a preview using IPR and adjust the falloff setting to create the look of shifting hues based on camera angle. If the image fails to update automatically when you make a change, press the IPR button to recalculate.



17 Create the final render In the Render Settings window, set the resolution and the rendering camera for your scene. In the OctaneRender Settings, set the 'Kernel type' to path trace and the 'Max samples' to 2,000, which should be enough for a high-quality image. You can render in the Render View window or create a batch render of the final image. If you would like to include render passes for compositing, OctaneRender has a long list of pass options, and these will be rendered as separate image files.



16 Tune Octane Materials Use the Render View window in IPR mode to tune the materials. Apply an Octane Glossy Material to the leaf. Use the Specular, Roughness, Index and Texture Power attributes to tune the Glossy Materials. Then use Reflection, Transmission, Index and Roughness to tune the Specular Materials. In the camera's Octane settings increase Aperture to between 10 and 20 to add depth-of-field blurring, and set the Focal Depth distance or turn on Auto Focus so that the wings are not blurred. Use Exposure and Response to adjust brightness and colour of the image and the Postprocessor setting to add bloom and glare.

Render Paint Effects in Octane

OctaneRender will render Paint Effects without the need to convert the strokes to polygons, but to do this you need to attach an Octane Material to the Material slot in the Transform node of each stroke. This can be very tedious if you have a lot of strokes applied to your model. This is a great opportunity for writing a MEL script. Write a simple script that loops through selected strokes, attaching a shader to each stroke. For an example of a script that does this, check out the OctaneStrokeMat.mel script included with the support files on FileSilo.

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AARON HUNWICK
Mia the Dark Elf, 2015

Software

Maya, ZBrush, Mudbox, Marvelous Designer, TopoGun, UVLayout, V-Ray, Photoshop

Learn how to

- Model an Elf in 3D
- Sculpt in ZBrush
- Simulate Elven clothes in Marvelous Designer
- Texture armour and skin
- Create realistic shaders
- Light and render a photorealistic fantasy scene

Concept

I based this piece on the Dark Elves of the *Warhammer* universe. These mystical fantasy creatures are rich in character and have a distinct style from any other elves.

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Create a fantasy elf character

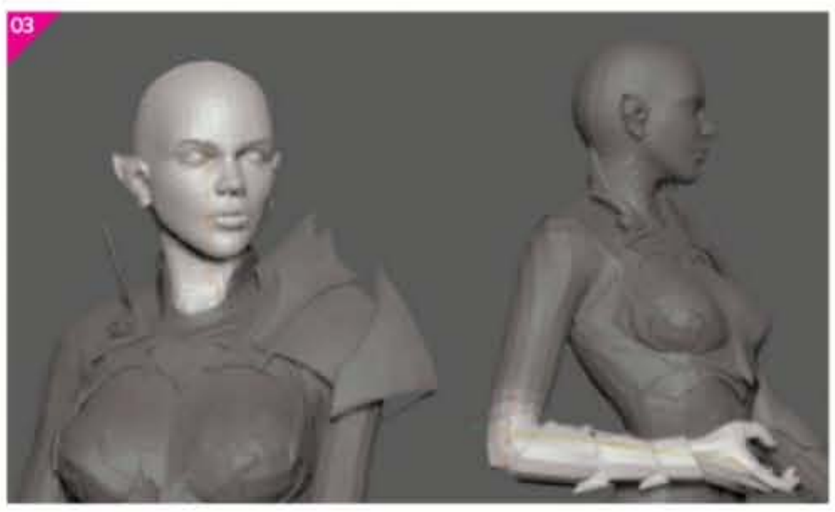
Model, pose and sculpt a character influenced by Warhammer

In this tutorial we will be covering the crucial steps in the modelling and texturing stages for creating a digital character, as well as a brief overlook of lighting and rendering. We will specifically look into techniques that are used for the creation of a character with a baked-in pose. Utilising powerful tools from ZBrush, we will be able to realise our final model and pose without worrying about rigging or topology for animation. The benefit of this workflow is that we can lock in the final pose and look of the character, and structure our elements around that.

01 Create a reference sheet It's always useful to gather all your images into one or two large files to make it easy to quickly look up any useful references you might need. For this type of character we should group armour, weapon and art style reference together, and in another file gather references of anatomy. It's always useful to have a good anatomy book on hand for quick referral.

02 Block out the anatomy Now we design the basic structure of the character. Use Maya to create a very simplified model of the female body. Keeping polygon density to a minimum means we can easily adjust our model without getting caught up in the details too early. After the base mesh is complete, export it into ZBrush for further refinement. Ensure you are constantly referring to your anatomy reference here. In this stage it is crucial to ensure your proportions are spot on, if they are not you will find it more difficult to adjust errors later down the line.

03 Refine the anatomy and topology Once we have a good amount of detail in the sculpt it is important to adjust the topology. Because of the simplistic base mesh we used, some areas of our model will need to be altered to allow for a denser polygon count. In this instance we will use ZRemesher to quickly automate the retopology process. Using Polypaint to determine areas of higher density like the head, we can get a good result quickly with very little effort. After the topology is locked in we can then add more refinement to the sculpt.

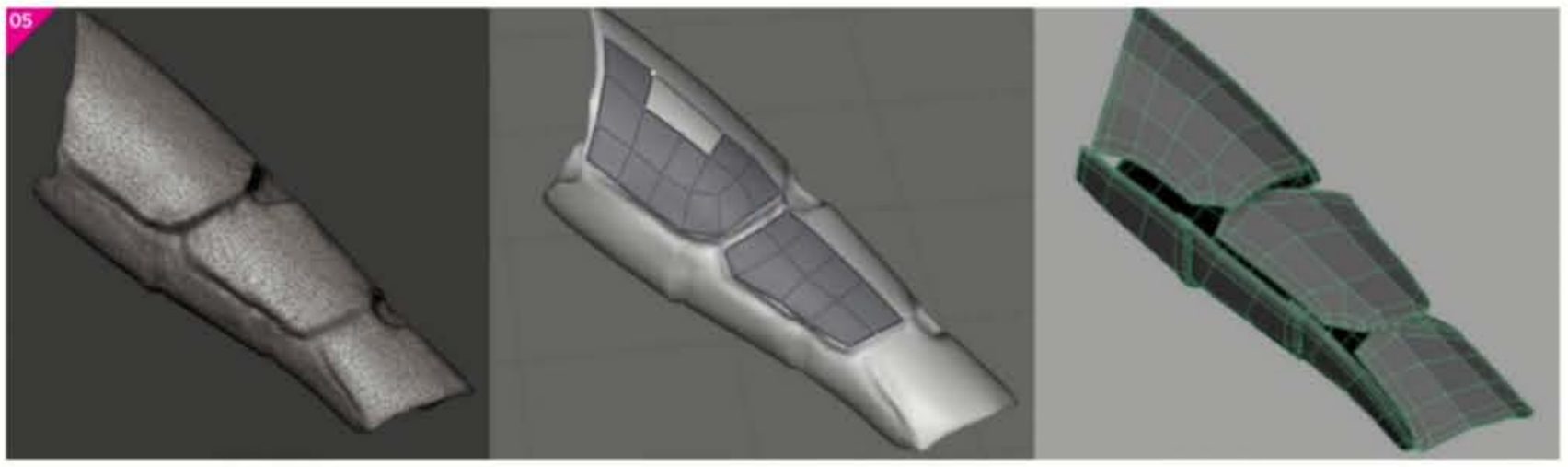


> “Using Polypaint to determine areas of higher density like the head, we can get a good result quickly with very little effort”

04 Block out armour design In ZBrush, mask out the area on your character where the armour will sit. Then extract a new ZTool, convert to DynaMesh and use this as a base to build out from. Slowly increase the resolution while focusing on the form and silhouette, this will ensure you don't get tied up in the details. It's good practice to block out all of your armour pieces before moving on to the next step, this way you can be sure that your shape language is clear and all your amour pieces are working well together.

04

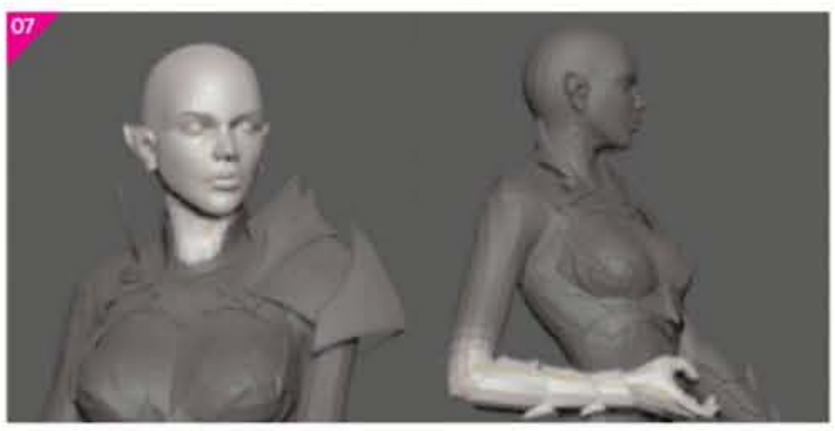
05 Create new topology Once you're happy with the amour design it's time to define the topology. Using Decimation Master in ZBrush we can export our blocked-out armour piece into TopoGun and build our base mesh. Then using Maya we will utilise hard-surface modelling techniques to refine the surfaces. Different types of bevels are key in selling what type of material you are modelling. For armour, having a very sharp edge is not always preferable. It's important to look at real-world reference as it helps ground your model in reality even if it's from a fantasy world.


05

06 Detail the armour We now need to bring our meshes back into ZBrush for a detail pass. Ensure that you smartly group similar material types together to make texturing and shading easier later on. You want to start by laying down some breakup on the surface, for example using the Clay brush with Spray mode and a gradient Alpha. Then using the Move brush subtly, adjust areas of the model, paying special attention to breaking up the silhouette. Then move to focus on dents and smaller scratches to add even more realism. Use surface noise to further define the kind of material you are mimicking.

06

07 Pose with Transpose Master Because we know that our final model is going to have a baked-in pose we can now use Transpose Master to pose our model. Make sure you have plenty of anatomy references related to the pose you're trying to achieve – **female-anatomy-for-artist.com** is a very good resource for this. If you have armour that sits over a deformed area such as an elbow or knee, you may want to hide it before using Transpose Master, and then move it into the correct position after completion of the pose.


07

The power of TopoGun

With access to automated software such as ZRemesher we often forget the importance of having complete control over our topology. Often the quick results need to be refined further to ensure we get the most out of our geometry. TopoGun offers us full control so that we are able to quickly draw and build very specific edge loops, which is especially useful for modifying our facial topology. Areas such as the eyes, mouth and nose will need extra attention and often more edge loops than the rest of the face. This is because they will need more polygon density to be able to deform correctly.

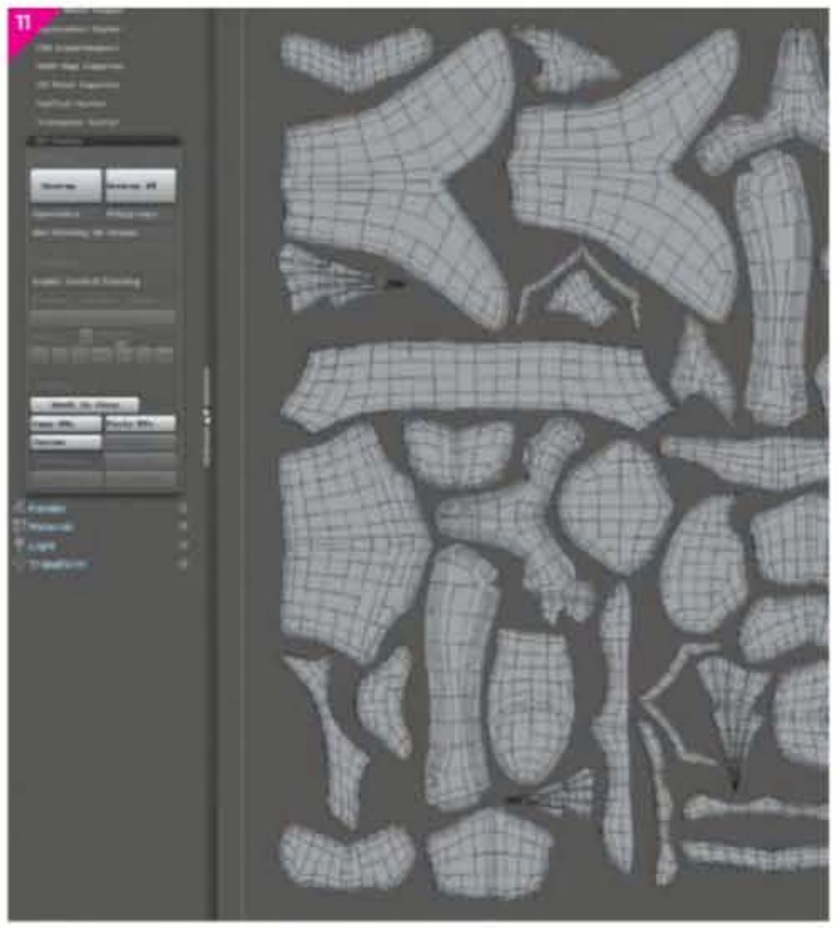
08

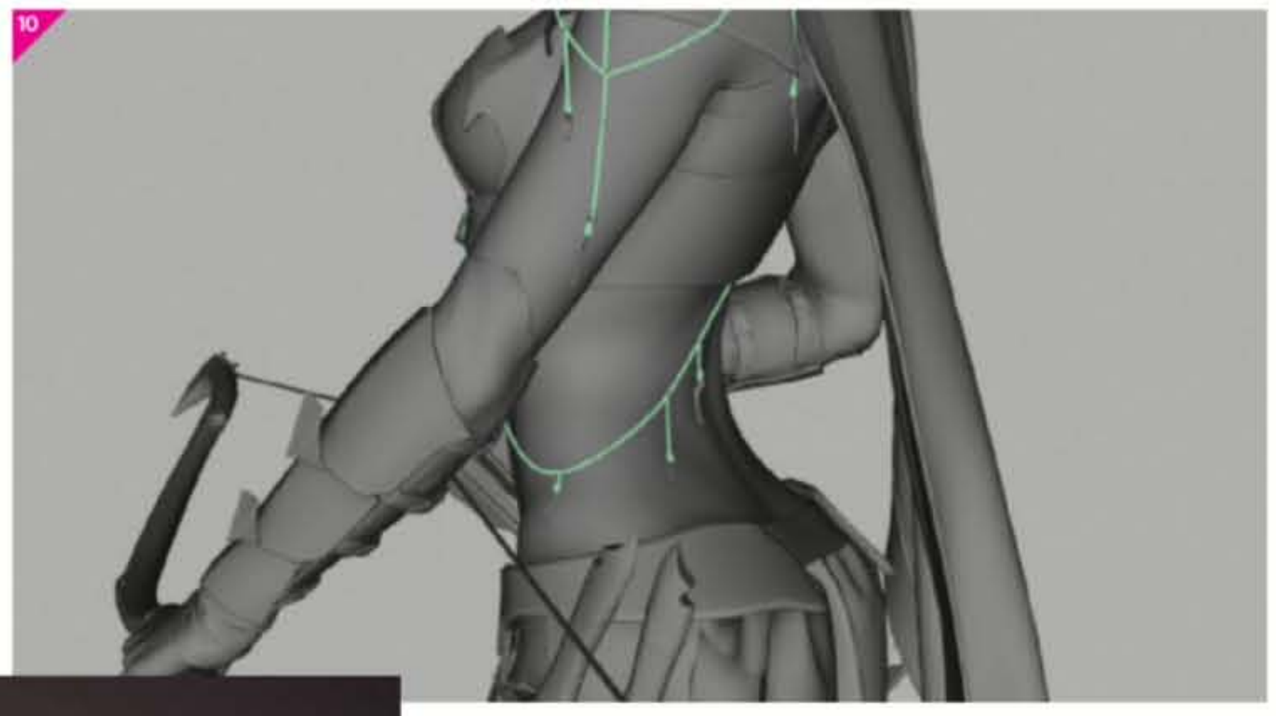
08 Create hair using FiberMesh When you are working with long hair it's critical to be able to isolate and work with small clumps one at a time. Before you generate the FiberMesh, break off the scalp into many small Polygroups that can be used to define the hair clumps. Turn on Brush>Auto Masking>Mask By Polygroups to ensure you're only manipulating one Polygroup at a time. Use the GroomHairBall brush to clump your hair together. Then use the Groom brushes to style the hair to your liking.

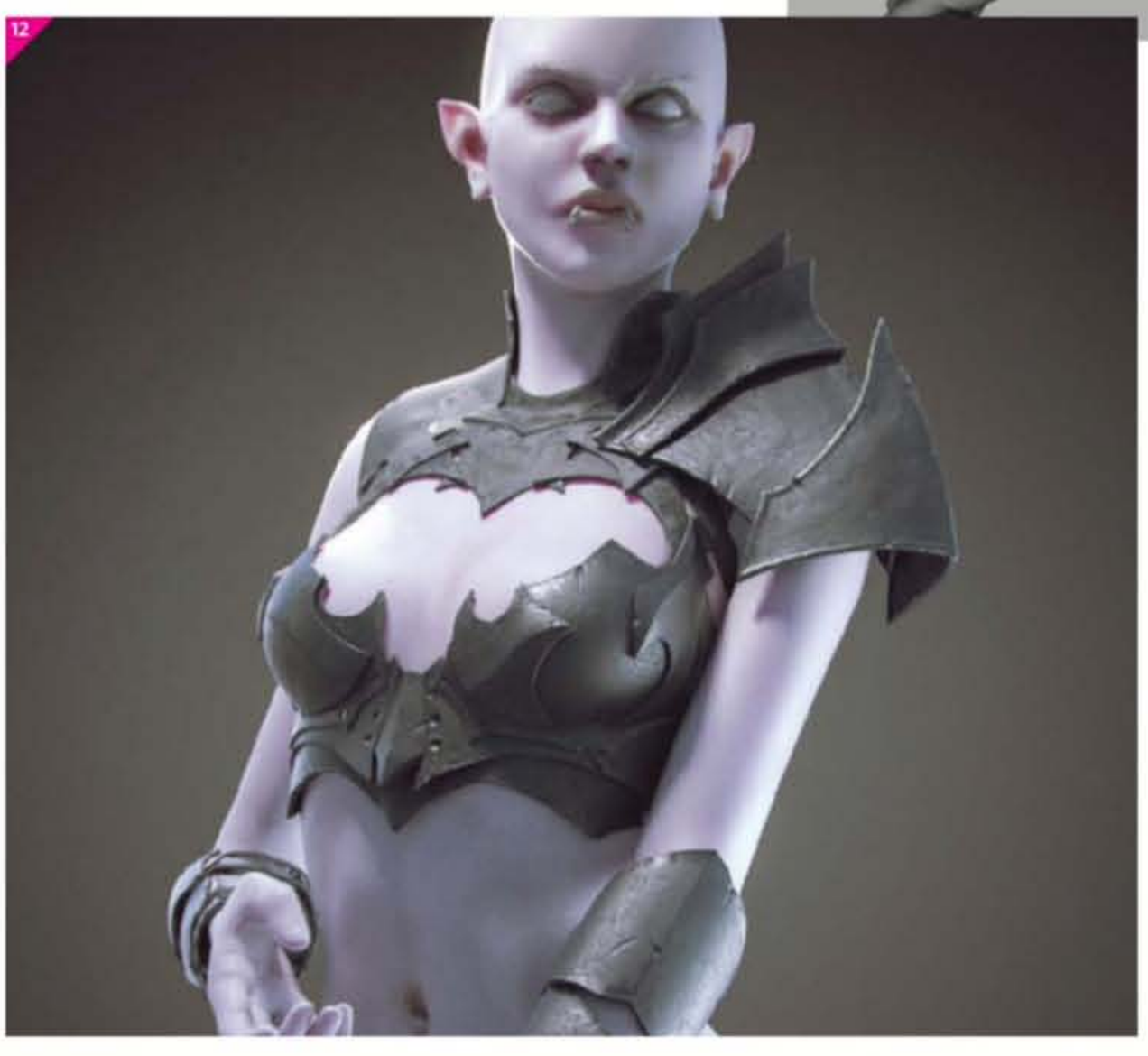
09 Simulate the cloth Marvelous Designer is a fantastic program to use for simulating cloth. The advantage of waiting until the model is posed for the cloth simulation is that you don't have to mess around with resymming. One useful technique is to use pinning to keep the cloth in the right place before you finalise your sim. Also ensure when you are blocking out your shape and positioning to use a high-particle distance to keep things running fast. Once that's finalised, decrease the particle distance until you get the desired level of detail.

10 Make the fine details and accessories Adding extra little details can really sell a model. For this model, hanging flesh hooks have been used as they are a common decoration on Dark Elves. These were simply modelled in Maya then exported to ZBrush for a detail pass, decimated, then bought back to Maya. They are attached to the model by string, which was created using the EP Curve Tool in Maya. Another good technique is to use fibres to break up the edge of the fabric so just mask by edge and generate them from that.

11 Make UVs There are many techniques that can be used for this step. UV Master in ZBrush is a great automation tool to get you started and for this project. It's perfect for most meshes because we will be projection painting in Mudbox where a perfect unwrap isn't necessary. Another great tool is Headus UVLayout. This software has very powerful real-time unwrapping that enables you to quickly cut and unwrap any surface with ease. It also has particularly useful colour coding for how much UV space the faces are taking up: red for too little and blue for too much.







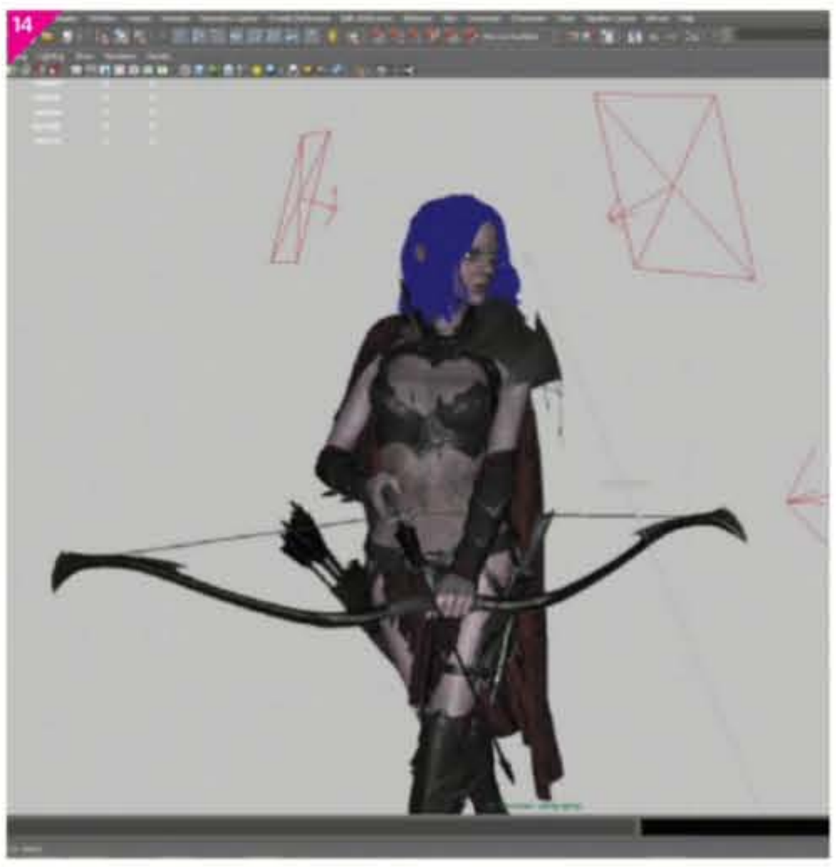
12 Set up shaders This step can take quite a while; tweaking shaders so you have the correct values is very important and often overlooked. Start with the specular and gloss values and then add in your diffuse colour. It's very useful to have these dialled in before you start work on your map painting because once you have multiple maps plugged into your shader, it's difficult to determine the individual effect of each map. Be sure to check your material references, having good photo reference or even real-world reference is crucial to mimicking the material in 3D.

Tips for sculpting in ZBrush

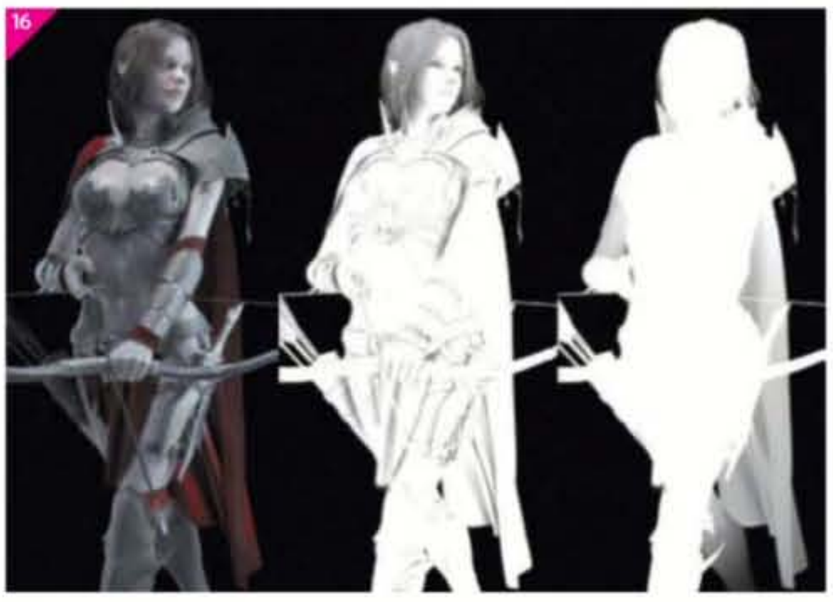
The theory behind sculpting in ZBrush is to block out your main forms on a low subdivision level – doing this at a high level will make it harder to create realistic forms, especially with organic sculpting. Slowly work your way up the levels adding detail. Consider how the surface would have been created – back in medieval times there would have been no way to perfectly make a piece of armour and your sculpt should reflect that. Always use layers when adding a detail pass – when you complete it you will have control over its strength and can easily mask out areas that don't work.

13 Create seamless textures Now it's time to take our model into Mudbox and use projection mapping to create some realistic textures. Mudbox is great because it uses a similar layer and painting system to Photoshop, and you can easily move your map between the two programs. To get your mesh from ZBrush to Mudbox there are multiple methods, but using Decimation Master is the best because you are able to retain a lot of detail while painting in a reasonably low-resolution mesh. Make sure you check the Keep UVs option and decimate to around three to ten per cent of your high-resolution mesh.

14 Set up lighting For this character we are going to use V-Ray for rendering. Often when lighting a character a simplistic three-point light setup is all you need, and this consists of a key, fill and rim light. When positioning the lights make sure you work with one light at a time so you know exactly how it's illuminating your model. Once you have completed your light setup, insert a dome light with an HDRI map at a very low intensity. Try to align your key light if your HDRI has a strong light source like a sun.



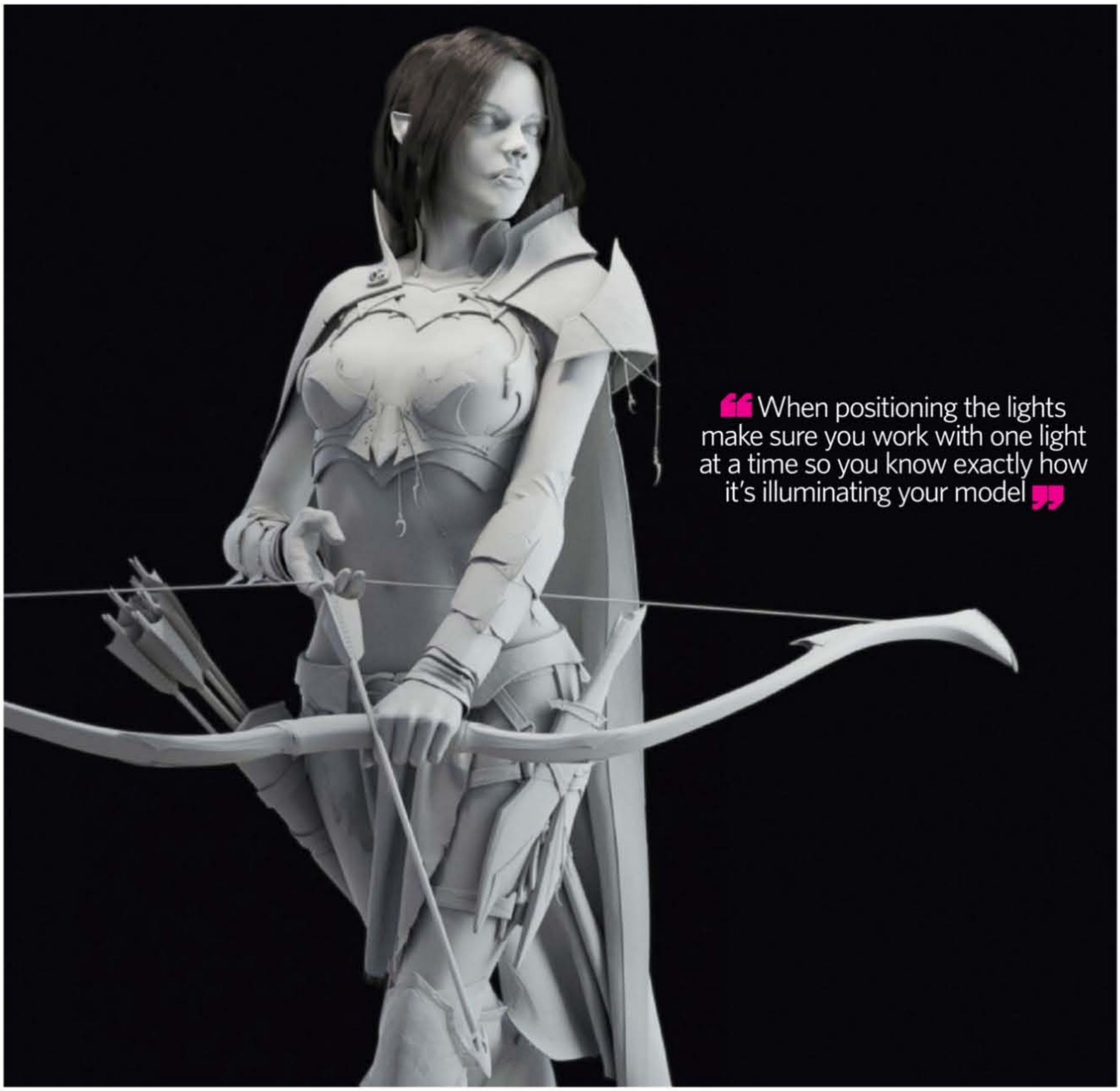
15 Rendering techniques The shader, texturing and lighting steps often overlap and you will find that you will be making tweaks to all of these while in the test render phase. It's important to have good settings for a fast test render and high-quality production render. There is a very good resource on YouTube by Andrew Weidenhammer based on a paper by Robert Nederhorst explaining in detail how to set up your V-Ray settings. To speed up your workflow make sure you set up a preset for your test and production render with Render Settings>Preset>Save Settings as Preset.



16 Postproduction work Render out a 16-bit EXR image to ensure you get the maximum control in postproduction. This is because 16-bit images have more light information and can be adjusted in Photoshop without loss of quality. Other useful passes are Ambient Occlusion and Z-Depth. In Photoshop the Camera Raw filter is very useful for colour correction of your raw image. Finally, adding some grain, chromatic aberration and other very subtle overlays can add that extra touch of realism to your piece.

Baking maps from ZBrush

Using the Multi Map Exporter you can easily bake maps that will assist in the creation of textures. We will need Displacement and Normal maps to get our mesh rendering accurately in V-Ray. The Ambient Occlusion and Cavity maps are useful to multiply or overlay on your textures. You can also desaturate your Normal map and run a high pass in Photoshop to add some extra detail into your diffuse and specular textures. A similar technique can be used if you bring in your Displacement map, adjust the levels and then use an overlay at a very low opacity. Just remember subtlety is the key.


When positioning the lights make sure you work with one light at a time so you know exactly how it's illuminating your model

Showcase

Aaron Hunwick

I work as a freelance 3D artist in London. I specialise in modelling and texturing for feature films, pre-vis, videogames and advertising. I enjoy spending time on personal art projects to improve my skill in areas that I wouldn't get the chance to improve on normally otherwise.

AH-1Z Viper Attack Helicopter **Maya, V-Ray (2014)**
It was hard finding all the references needed to make this look like a real helicopter but it paid off in the end.

PSP Transformer **Maya, mental ray (2010)**
This PSP Transformer project was inspired by the various Transformers that can be seen in the Michael Bay series of films.

Technique focus

Incredible 3D artists take us behind their artwork

TEXTURING MARI is great at handling UV seams so that you don't have to spend endless hours making perfect UVs for models like this. When it comes to textures I approached this piece in a physically based way. For the rubber tyre I sourced photos of real racing tyres and mixed in pebbles with Displacement maps so that they would show in the silhouette.

Andreas F Ezelius
behance.net/enzodiac

Andreas has been working in the videogame industry since 2007, and likes creating vehicle designs

Software Maya, 3ds Max, ZBrush, MARI, Corona Renderer, Photoshop

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Rainer Duda
rainer-d.de

Rainer Duda is a Houdini TD who specialises in advanced environment creation techniques and enjoys life to the full

Maya, MARI, Photoshop
Valentina Rosselli
vrosselliportfolio.wix.com/vrossportfolio

Valentina is a highly motivated 3D artist with a background as a painter. She works in London as a freelancer

ZBrush
Gustavo Åhlén
facebook.com/gustavoahlenstudio

As the founder of Svelthe, Gustavo is also a professional 3D/ VFX designer and matte painter

NUKE
Paul Champion
linkedin.com/in/pchampion

Paul is a 3D and VFX BA, MA and MSc course demonstrator at Bournemouth University's NCCA

Cinema 4D, V-Ray, Photoshop
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modern-age-studio.com

Working as a 3D artist and art director freelancer, Nicolas has also worked on ads and magazines

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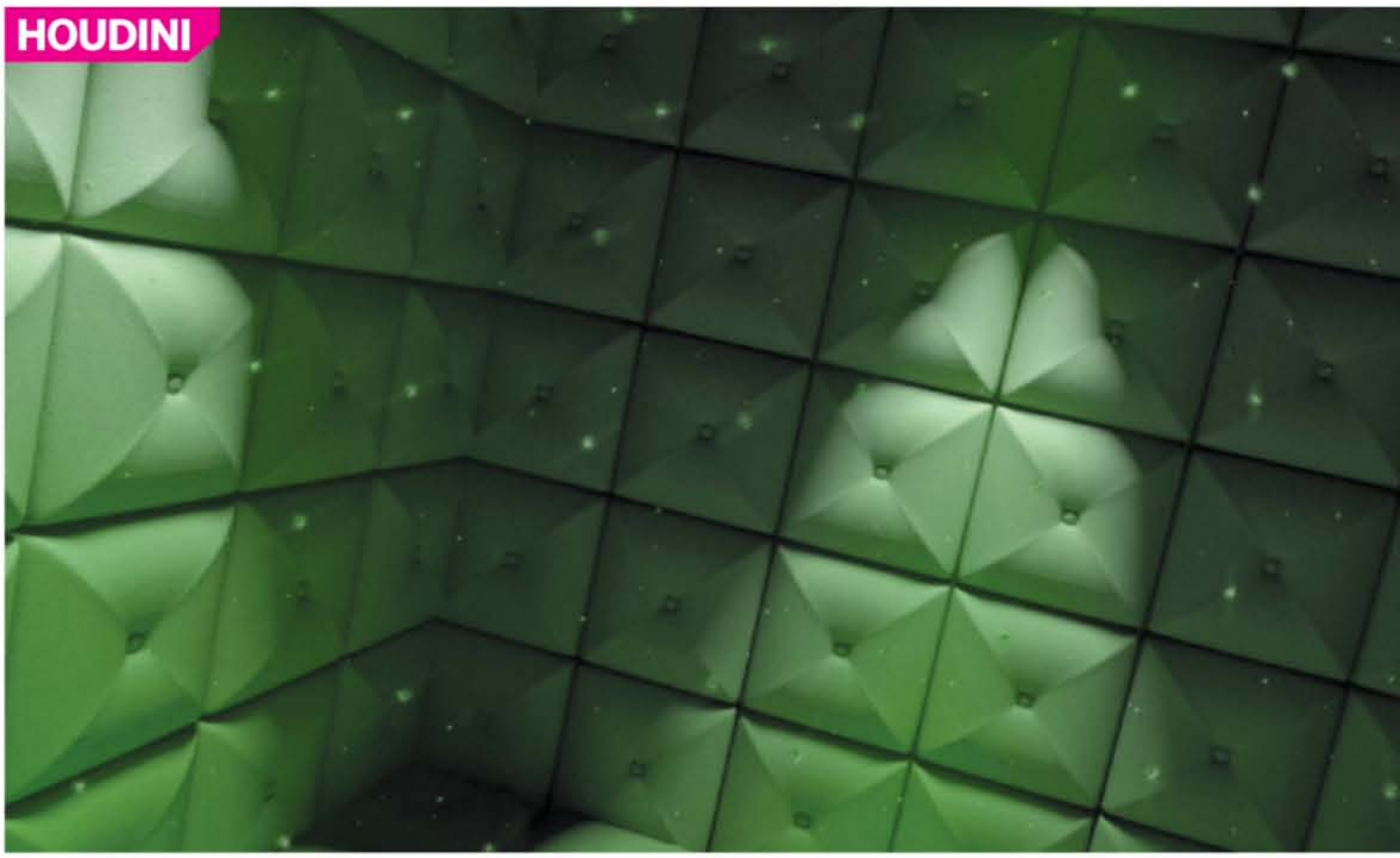


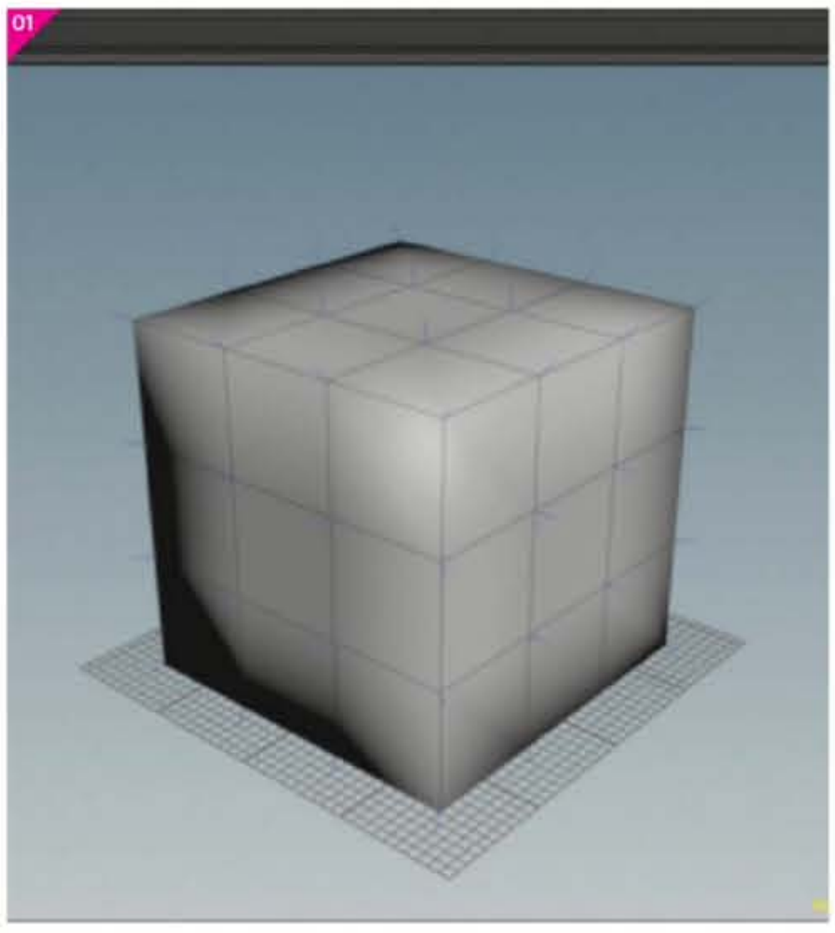
Scatter a scene in Houdini

In this tutorial we take a closer look at Houdini's capabilities when it comes to scene construction techniques. We will create a small system in detail, which enables artists to create rooms without worrying about manually positioned assets. The keyword in our process is scattering, which is a procedure where an algorithm places objects to points spreaded around a specific input geometry. The core idea of scattering is fine but due to a lack of control regarding explicit positioning we will make use of a point array as scatter input in order to place tiles and deco objects. Therefore we will define a whiteboxing system which fits with all assets in the specific unit size of the scene.

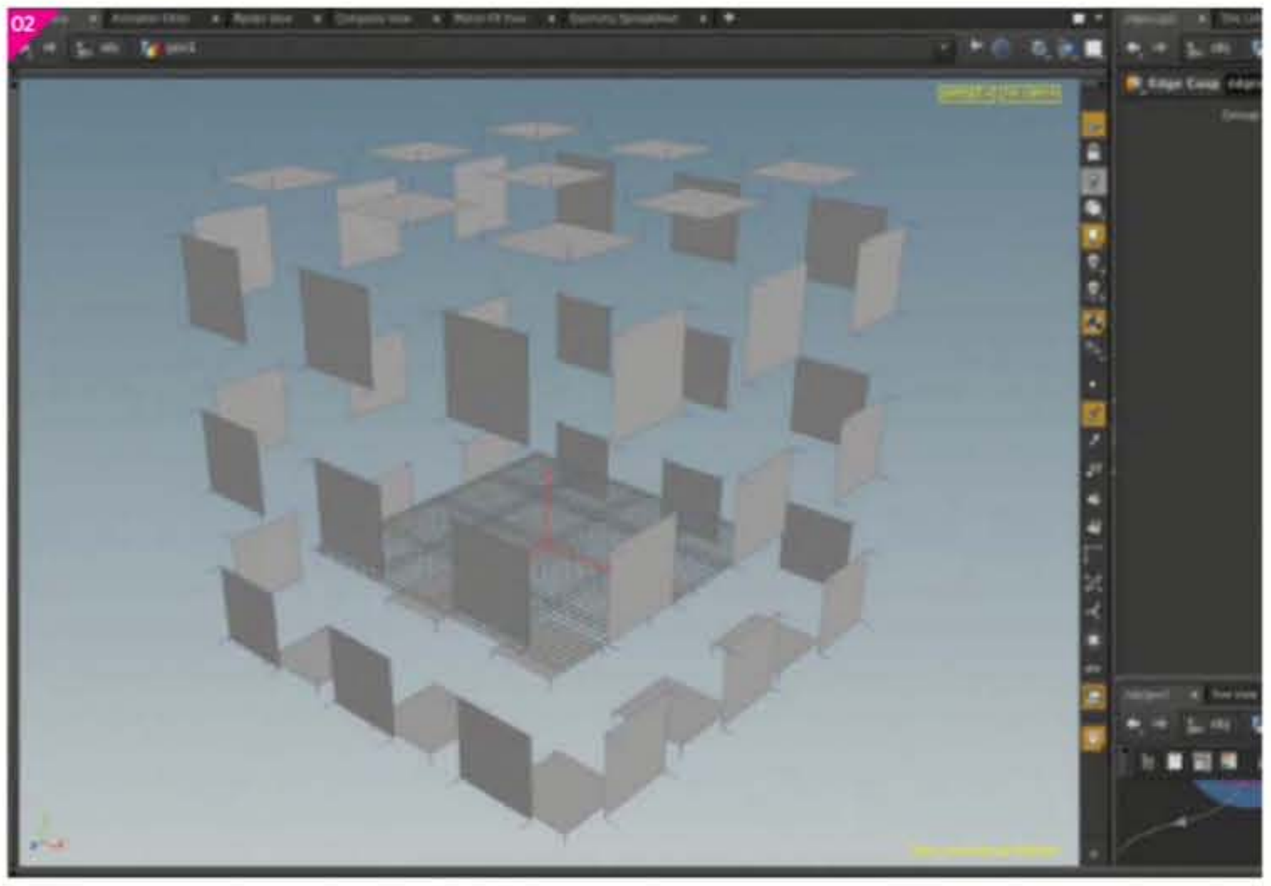
We define a room by the use of a polygon cube geometry. After a subdivison step, the preparation starts and it will be time to cut the already visible tiles to separate primitives. Through an exploded view we have a better look at all the tiles which will make it easier to see the point numbers that we need later. Each separate tile will be subdivided again into four quads because we need the centre point in the bigger tile. This will be the anchor where the objects – the pillows – will be placed later. In addition to the pillows, which form the rubber cell, we place some lamps too.

To tell the system where it needs to place all objects exactly we use a special method. We resort to the group SOP: an operator which lets us define a specific set of points which we can pack into a group. Afterwards it's time to feed two copy SOPs – the magic placement. The copy SOP takes two inputs. First, an object will be placed and secondly there will be a template for where it will be placed. That's basically a primitive input, but by adding the group name which we defined earlier its easy to set the correct positions.

01 Build the cell We start off by creating a geometry node and delete the node inside. Instead we need a box node. For primitive type we choose polygon mesh for an initial subdivision. Now set the size for x, y and z in each case to 3. To align the box with the grid we use a simple expression. In the centre field for the y axis, so just type: 'ch("sizey")/2', which basically means that we set the centre to a value that is half of the box's height. This is a solution which lets you easily position your objects on the ground plane.

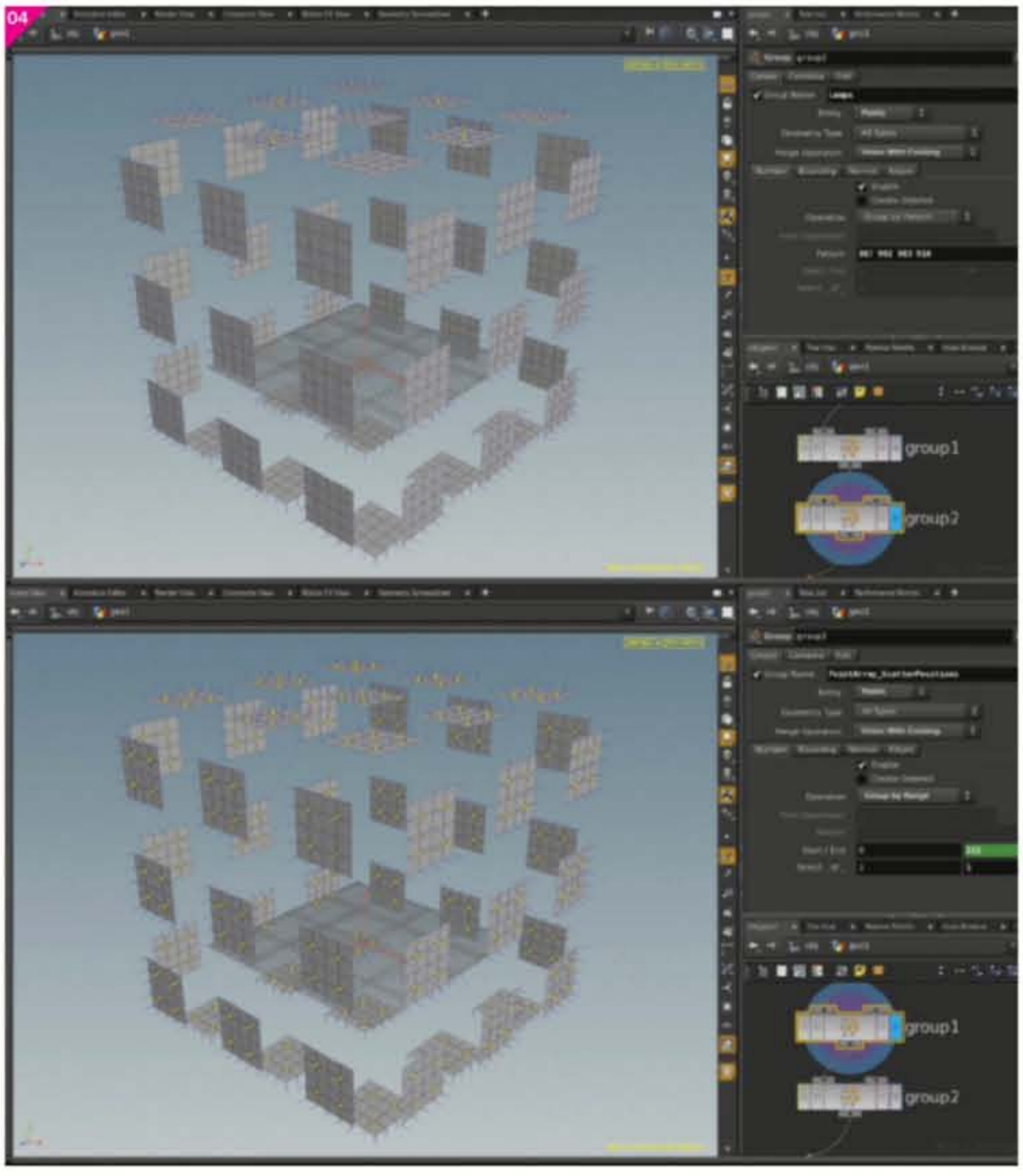


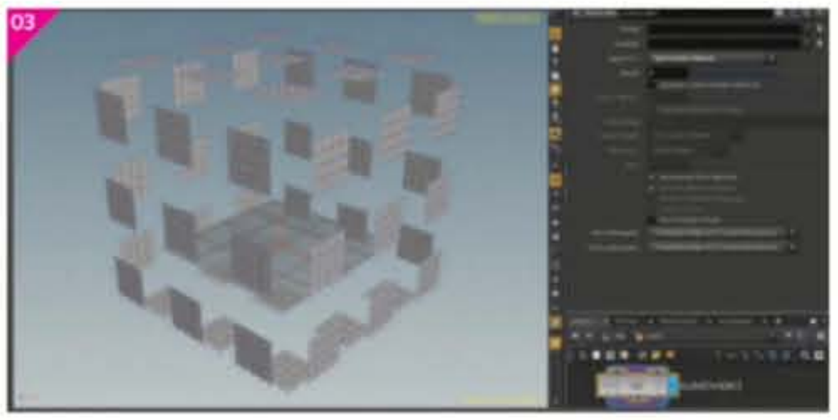
02 Intelligent slicing of the tiles Our next step is the creation of an Edge Cusp node. This SOP takes an input geometry, in this case our box, and splits the faces. Usually this is used to fake hard edges on an object but technically it splits the faces to separate objects. This principle will be easier to understand in our next step. Let's add an exploded view node to the Edge Cusp node. Both nodes don't really need additional changes. Just create and append them one after another to see all single tiles at the end. These are not subdivided here – they are single planes.



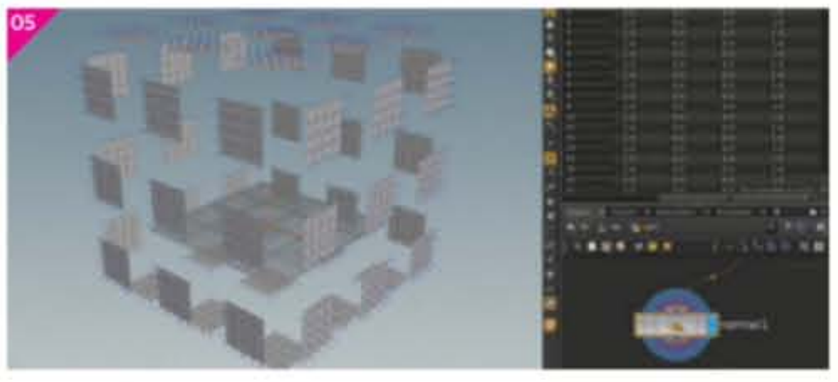
03 Subdivison and tiles Now it's time to prepare each tile with a specific amount of subdivisons because we want to give the copy SOPs a clear base to scatter the pillows. So, we will need to append an subdivide SOP node. The result by now is far away from what we expect. That's the result of the used algorithm. To get a proper result we change the algorithm to OpenSubdiv bilinear with a depth value of 2. Each tile should contain 16 quads. Now we are ready to start grouping points that we need.

04 Creation of logical point groups In this step we define explicit positions for the scattering. At first activate the Display Point Numbers function at the right side of the 3D viewport. Afterwards we create and append two Group nodes – one after another. The first Group node gets the Group name: 'PointArray_ScatterPositions'. The second Group node will collect points for the lamps. The Group name here will be 'Lamps'. Both nodes need a Merge Operation of 'Union With Existing'. In the first Group node activate the 'Group by Range' operation and set it to 0 – 215 with a step count 1 of 1. For the Lamps use 'Group By Pattern' and set the values to '867 902 903 910' in Pattern.





05 Add normal info to points What we have left on our scattering base now is the point normal information. To add them we simply create a normal SOP node and append it to the last Group node. With the default values we now have added valid normal information. Just add the normal information to points – this will be handy when we prepare the whiteboxing assets and their placement. This is also the number one choice when it comes to making an object with hard edges or soft edges without cutting the geometry at all.



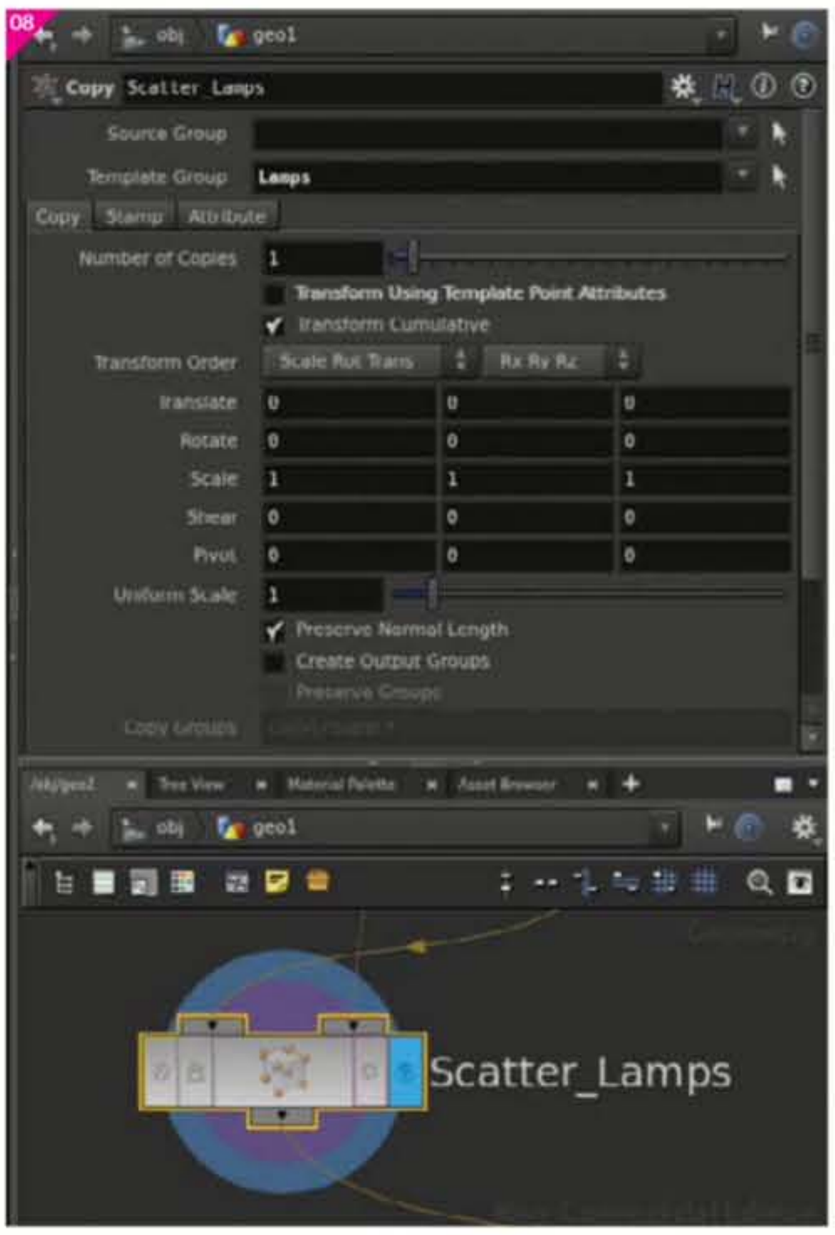
The scatter orientation by making use of attributes

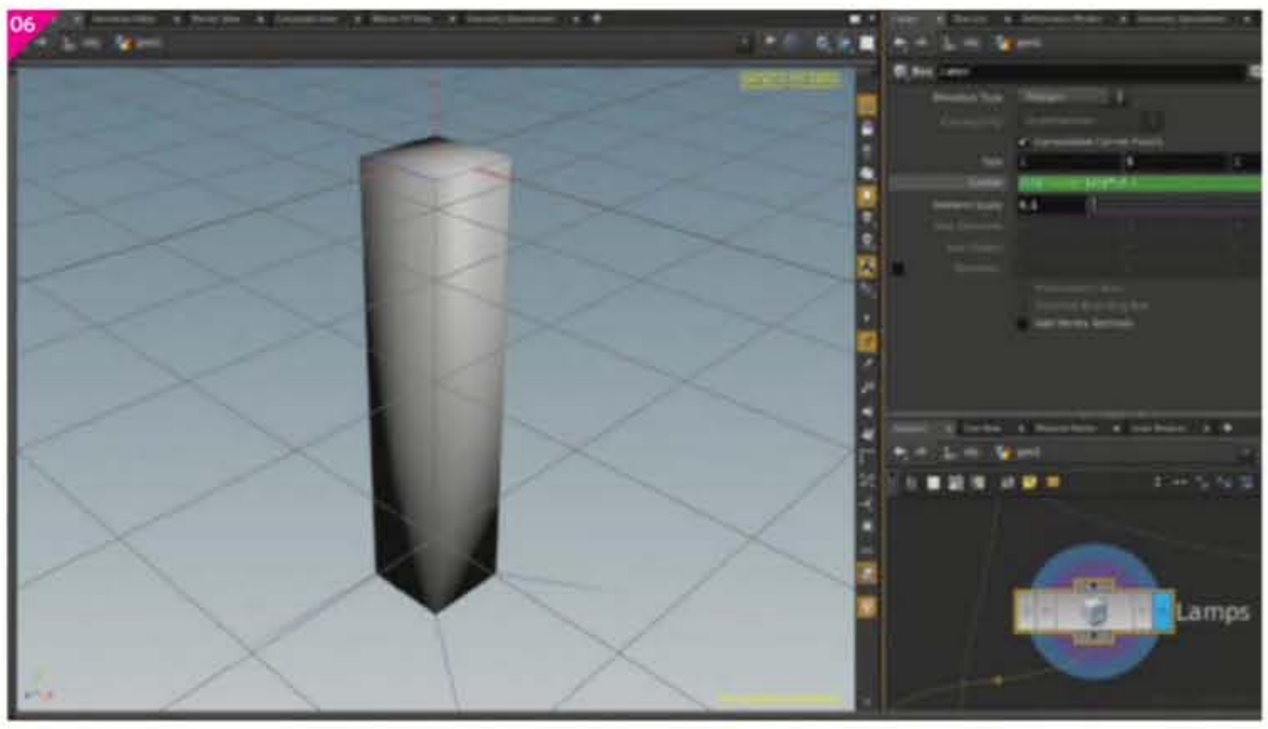
We scattered objects along a self-made point array but the appearance is always the same for each tile. You can break through this if you want to rotate the tiles randomly in 90-degree angles. The copy SOP is one of the most powerful tools in Houdini and enables you to stamp various attributes across the scattered objects. You can randomly change material as well as texture attributes or the rotations to give your scene a more natural look when you work with colours and textures.

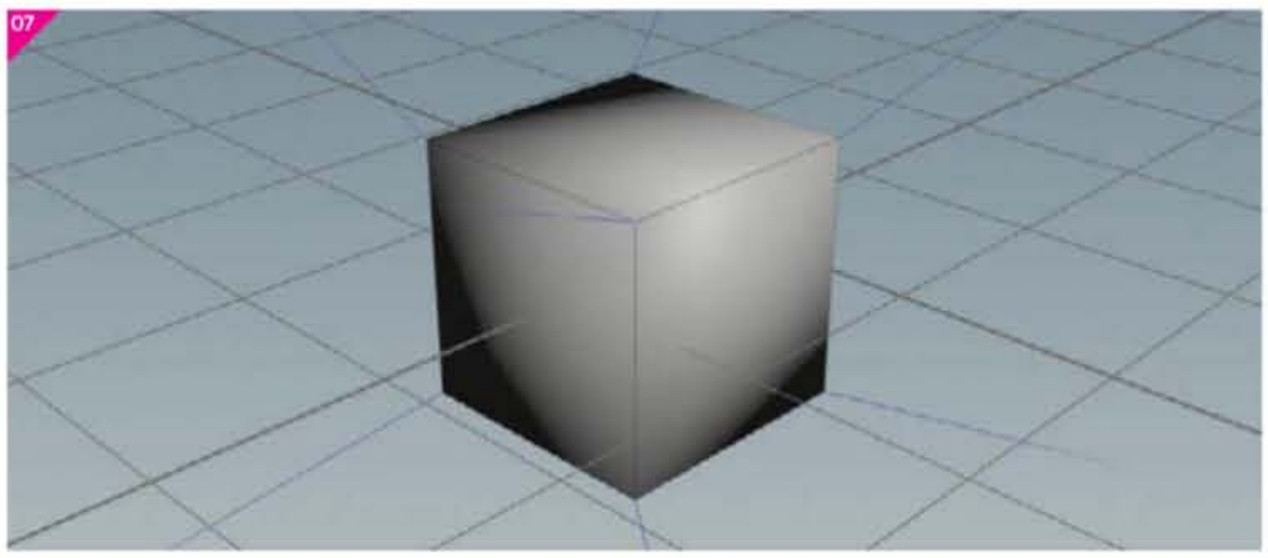
06 Whitebox to test the system Before we use final assets we make use of simple whiteboxing assets. Let's add two polygon boxes, name one 'lamps' and the other one 'pillows'. The lamps need a height of 5 but this time use the Uniform Scale parameter and shrink it down to 0.1. Last but not least, let's position the lamp on the grid via a centre of the Y expressions of '(ch("sizey")/2)*-0.1'. It is important here that we not only divide the overall height by two but also take care of the Uniform Scale which we had decreased. We need the minus value so that the lamps are facing down.

07 Whitebox the pillows The pillows have a quite similar setup to the lamps. We leave the overall size at one and just play a bit with the Uniform Scale parameter. We decrease it to 0.125, but this time we make something special. Instead of aligning the box to the ground plane we move it to the left from the viewer sight of the viewport. We go into the centre of the Z area and add the following expression: '(ch("sizex")/2)*ch("scale")'. Instead of typing the accurate value into an expression you can also use a relative reference of the copied parameter as well.

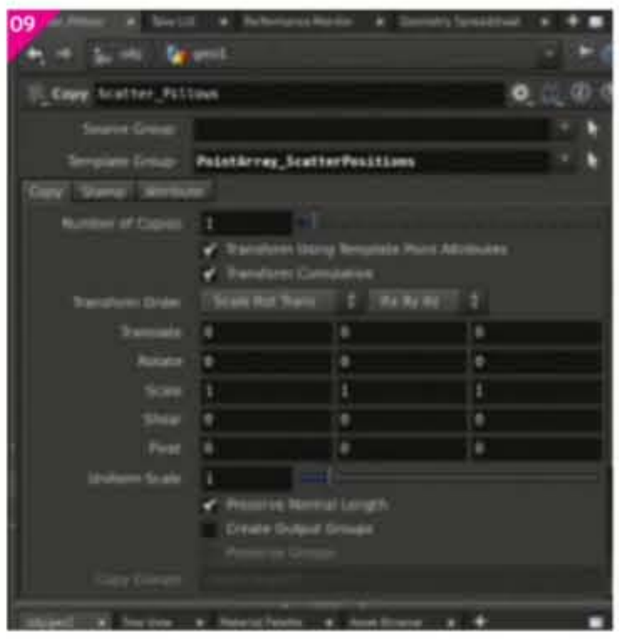
08 Bring in the copy SOPs Now what we have left is to spread the whiteboxed assets around are the copy SOPs. We need to create two of them. The first one will take care of the positioning of the lamps. Let's plug the lamps to the first input and the normal SOP to the second input. But before we move one, remove the hook at Transform using Template Point Attributes and add the name 'Lamps' into the Template Group slot. It will say that the copy SOP should only use the points in this group for the scattering.



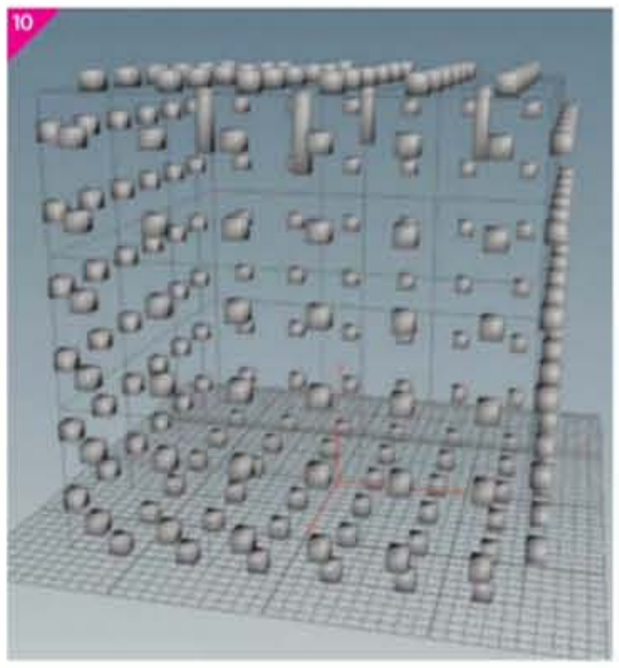




09 Groundwork for pillow placement The copy SOP for the pillows needs some adjustments as well. At first we connect the whiteboxed pillow object with the first slot and the normal SOP with the second input. This is really important here as well as the Template Group. Just add the point group: PointArray_ScatterPositions. The points of this group basically holds all of the centre points of the four subquads in a big tile. We will use these points as roots for the pillows. Leave the flag active at Transform using 'Template Point Attributes'. The whiteboxed pillow was moved to the left which gives us, in combination with this function, the result of pillows scattered on the outside wall.



10 Clean up for a test setup To test the complete setup we need to combine both branches of nodes together. Therefore we will create a Merge node and plug both copy SOPs to its input. We prefer to have a clean and structured setup here. At the end, add a null node and call it 'Geometry_Export' for a clean end. To complete the room simply bypass the exploded view node and all tiles will fit together again. Just make sure that you don't bypass the Edge Cusp node, otherwise you will have to change the point numbers in the groups.



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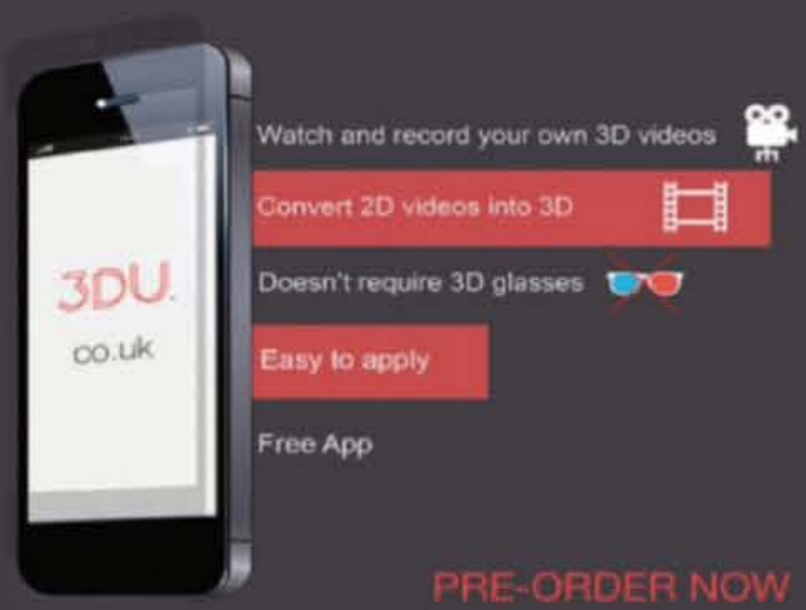

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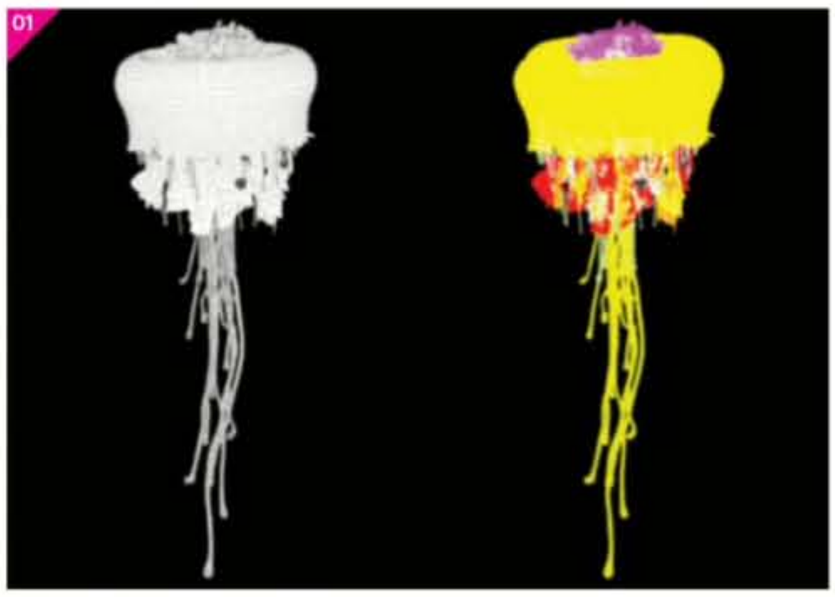
Animate a jellyfish

This tutorial will help you understand the pipeline process of building your own jellyfish from scratch and simulating it in an underwater environment with Maya. It will provide you the techniques to learn quickly and give your project life. We will discuss the best way to think about the jellyfish in relation to the animation, model according to the simulation needs, learn how to work with a Nucleus system (using nCloth, nConstraints and Wrap Deformers) and finally how to bake everything.

This tutorial is suitable for people who have a basic knowledge about Maya nSystem but also for people who may not and want to start using it. It is really important to be organised from the beginning. After you choose your preferred jellyfish, make sure you build a detailed concept according to the animation as explained in Step 1.

The best way to create it is to break the jellyfish into different parts thinking about it as if it is as composed of layers. For example, as you can see from the images of the tutorial, this jellyfish has one layer for the swimming bell, one for the shape on the top, three for the lappets placed inside the bell, one for the small structures on the lappet and several tentacles layers different in terms of scale, and each of these have been duplicated a certain number of times. It is necessary to collect video references to completely understand the way that a jellyfish moves. Make sure you test the simulation of each nCloth layer separately and once you are satisfied with the result, you will be able to build the master scene.



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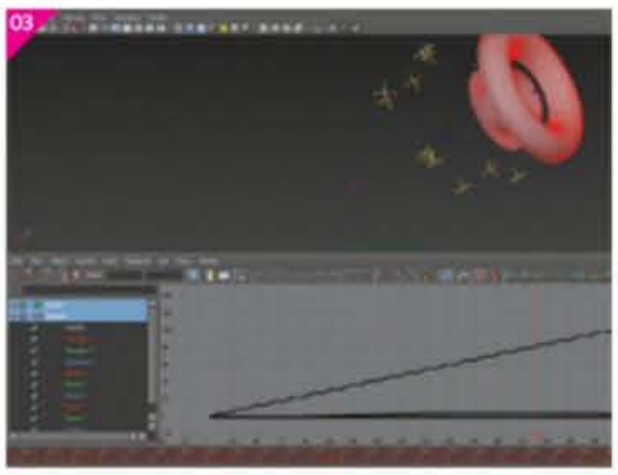
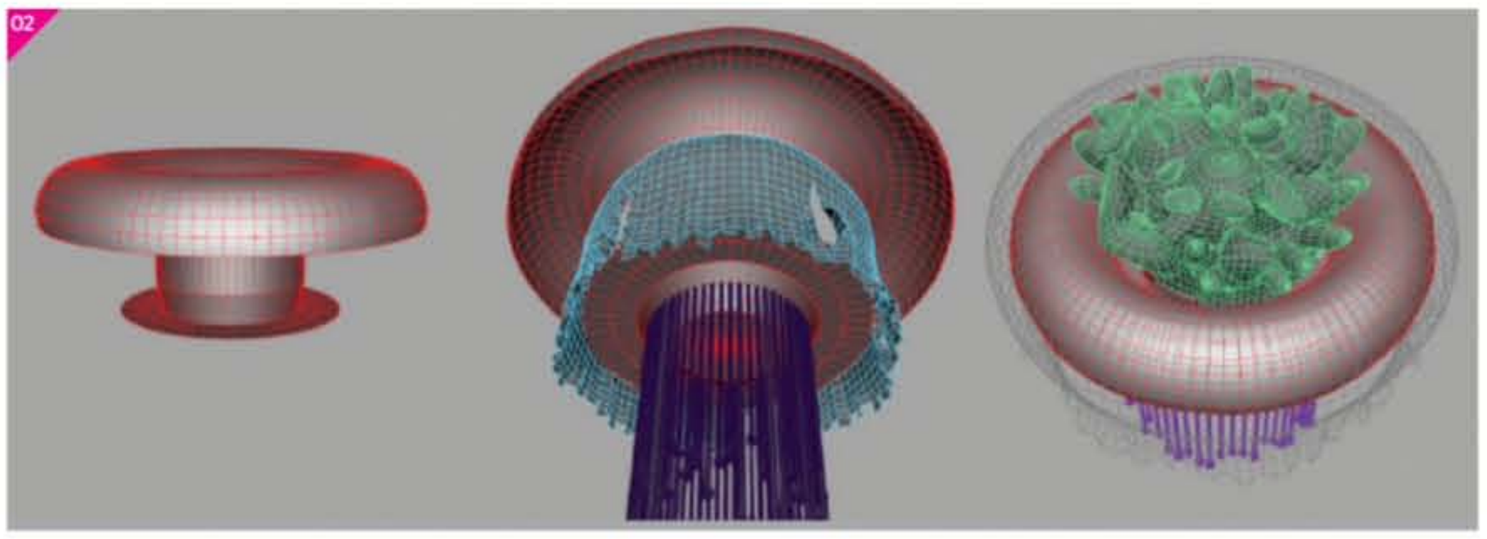
01 Model according to the animation Paying special attention to the jellyfish's structure, we can divide it into different layers in relation to its major surfaces and axes. As briefly mentioned earlier, we have the following layers: one swimming bell, one smaller bell structure on the top, three lappets, one for the small structures on the lappet and six types of tentacles, with each one duplicated a certain number of times. Layers have to be modelled in a straight pose, paying attention to not go too far with the number of polygons. As you can see from the images, meshes are combinable so once you have modelled the main structures you can also play with their position and scale. In the meantime make sure to design a proper supporting structure as explained next.

02 The supporting structure Shown as the red wireframe, the supporting structure is a Passive Collider mesh built to drag behind each nCloth layer and their nConstraints. In order to do that you have to link the vertices of the last edge loop of a layer with the one corresponding to the supporting structure. The supporting shape has to be designed in order to not collide with layers in straight pose. For instance, the swimming bell is modelled with a hole in the top in order to place its last edge loop next to the edge loop of the supporting structure. Go ahead with this method, taking into consideration the layers' position and move to Step 3 when you are satisfied with the result.



03 Start to animate Once you have the final model of the supporting structure let's move to its animation. This step is essential: you can choose the method that suits you better using an expression or key framing. Make sure to collect video references to understand the movements before animating it. The most important thing to know is that the structure will lead the animation of the nCloth. Once you have animated the supporting structure, make it a Passive Collider and go to frame one. The next step is to make each layer an nCloth.



04 The underwater environment Once you've converted the layers in nCloth you need to deal with the settings of the Nucleus system. Its attributes depend on the nCloth properties and vice versa. To help simulate movements underwater it will be better to increase the air density and reduce the gravity in the Nucleus node. In order to add detail and realism you could create an emitter to simulate some particles underwater. In case you decide to add them you can play with Fields affecting the nParticles. Depending on the effect you want you can also add the Field to the nCloth layers of the jellyfish at the end but try not to go too far with them.

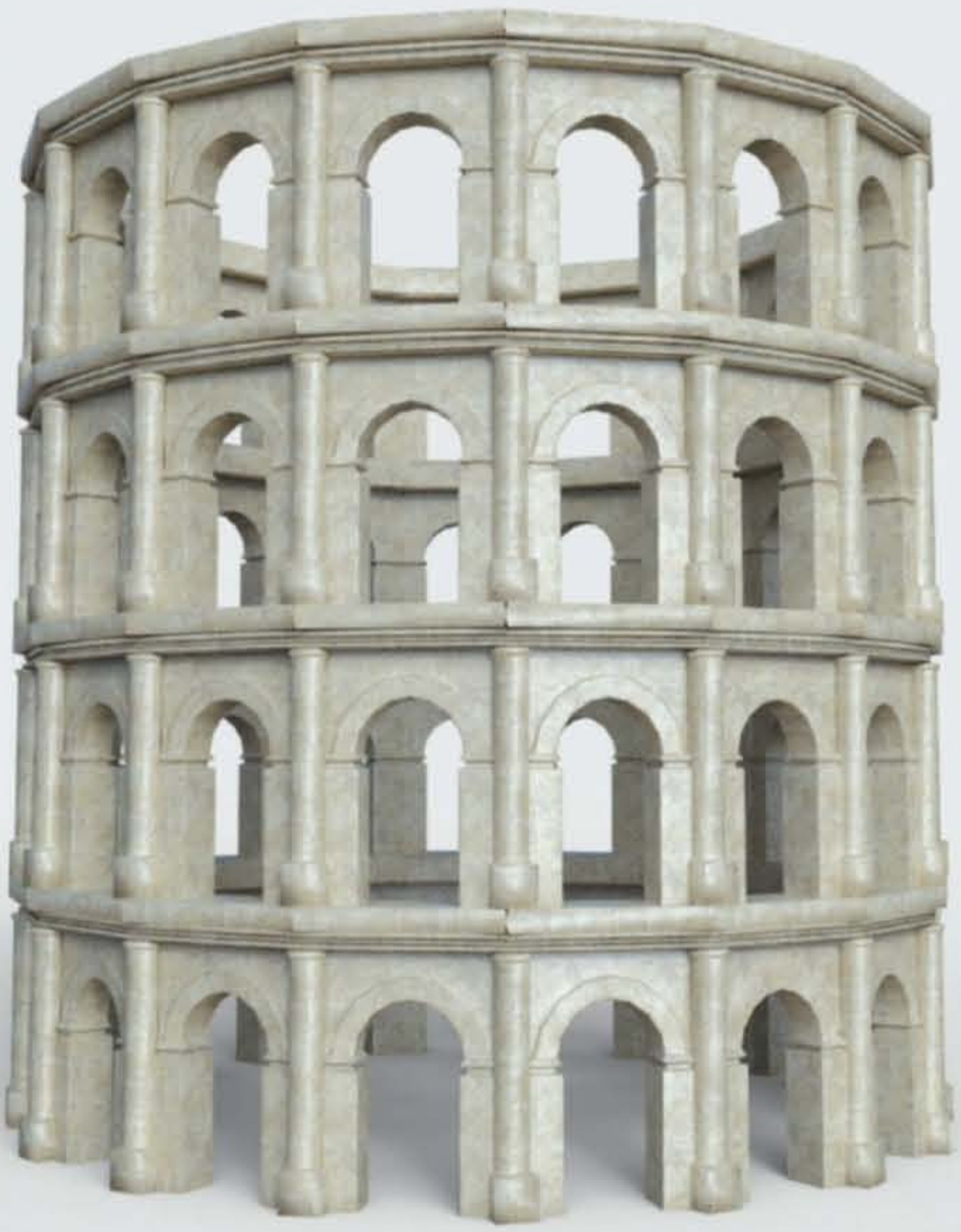
05 Add nCloth layers Each nCloth layer has to be connected to the supporting structure with the edge loops of nConstraints. Proceed layer after layer and go by degrees. Test the properties of each nCloth separately before building the master scene and keep in mind that each part reacts differently underwater. You also need to collide each layer with each other but be careful with heavy simulation. According to the settings of Nucleus, don't increase the mass of the nCloth too much. Also set Drag, Lift and Damp to a low value.

06 Bake simulation and tips To avoid having a heavy scene you could bake a simulation of the layer's vertices or build an nCache once you have completed the simulation. You could also build low-poly meshes for the layers just for the simulation and then assign them to corresponding high-poly ones with a Wrap Deformer. Simulating the jellyfish is obviously not the only method you can use to animate it, you can also do it with nHair and Joins.

Make sure your project is well organised

To avoid any issue during the animation process and to not lose time you need to design your concept at the very beginning of the project. Always test your simulation in separate scenes from the master one. The complexity of the simulation could give you a hard time so to avoid stress just be precise and organised with your project, it will be more fun doing it and you will hit the mark sooner.

ZBRUSH



Master ZModeler and Array Mesh

With the release of the ZBrush 4R7 comes new features such as that of ZModeler and Array Mesh – and these two will be our focus of this tutorial. After learning the next steps, you will be able to model work like you never did before. Before going further we recommend you to learn the fundamentals of ZModeler, then after following a few extra tutorials you will understand how to use each new feature separately.

The ZModeler brush has a group of options called Polygon Actions, Target and Modifiers. In Polygon Actions you may notice some familiar options such as bevel, extrude, bridge, split, delete and so on. The Actions group is also linked to Target. To access its Poly menu you need to hover over a polygon before right-clicking. Keep in mind that Polygon Actions operates over polygons, edges, points and curves in a PolyMesh3D. The Target group is fundamental because when you understand how it works correctly, it will save you a lot of time. The Target group describes the polygon selection and to what polygons the actions will be applied. The last group, Modifiers, keep a series of extensive features linked to Polygon actions and this enables us to increase the level of options per action drastically.

We will also be looking at the Array Mesh feature, which will enable us to create infinite copies from a model following different patterns as spirals, circles and so on. Array Mesh is an advanced system that helps you duplicate instances of geometry in patterns and shapes. This system is perfect for creating structures like buildings, geometry patterns and so on, because when you duplicate geometry as an object, it has an Append New option that creates a new stage keeping all the changes previously done. You will notice the previous stages in the option of Transform Stage. Then when you modify something in the first stage, this will be represented in the last stage.

In this particular tutorial we will create arched doors and columns, and with the help of Array Mesh it will allow any kind of geometry to follow any kind of pattern. This tutorial is to show you some features through a simple model.

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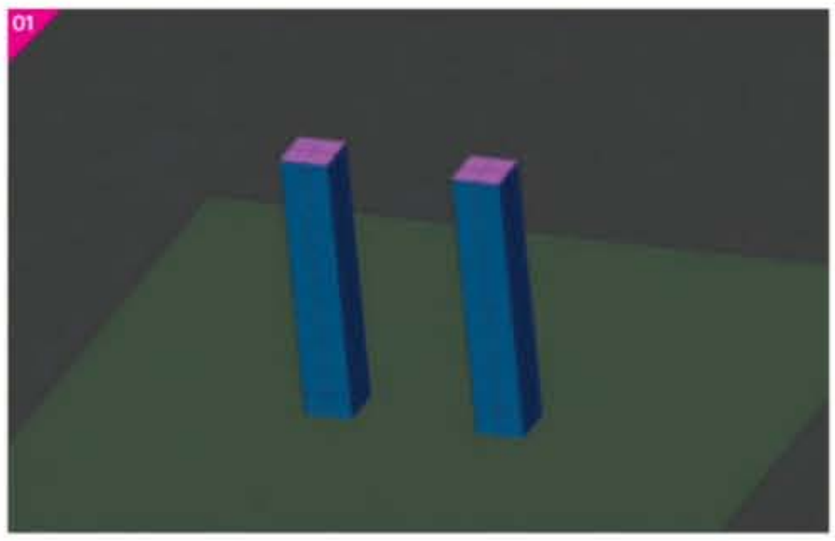
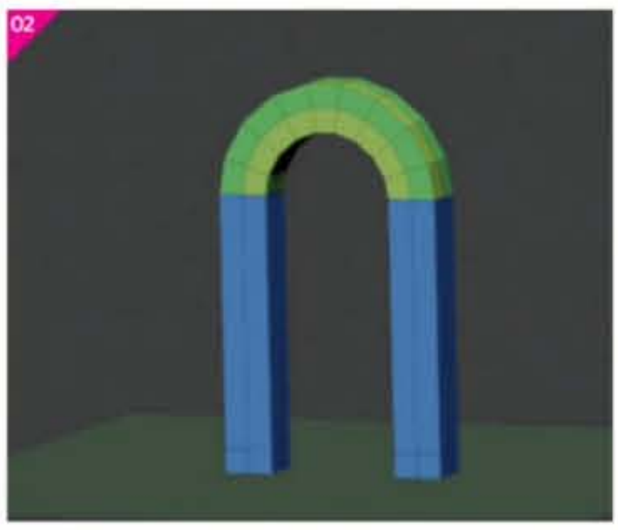
01 Quick mesh with QCube In the first stage you need to add Cube3D, then you need to convert this object to PolyMesh3D. Go to Tool>Initialize and change all the values to 1 for x, y and z, and then click on QCube. Now you will need to hover over the top polygon, right-click and select QCube, set the Target as Flat Island, left-click over this surface and drag, and finally hold Shift and drop. Go to Geometry>Position now and change the x value according to your desired width of the door. Now just go over to the Modify topology and select 'Mirror and Weld', activating the x axis.

02 Join the parts It is time to activate the x symmetry now by going to Transform>Activate Symmetry. To create the two columns, delete the top polygons of both columns using Polygon Actions and delete. Then, select an edge of the opened top edges, right-click and select Bridge (set Target as two holes, as a circle and then set Modifiers as Optimal Curvature). Once you have selected Bridge, you need to select two edges in the top on both sides and drag and drop. This feature will join both opened columns with a rounded bridge so you can join two separated parts in as few steps as possible.



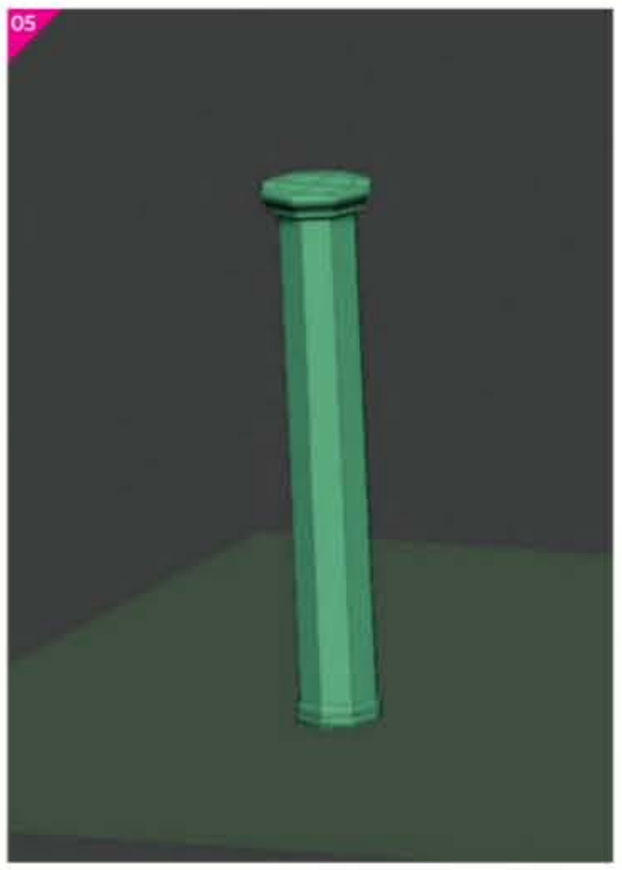
ZBrush ZModeler brush

The ZModeler brush keeps a perfect combination between Actions and Targets. You should test each Action combined with each Target, and then you will understand how to apply each Action correctly. We recommend you learn the fundamentals because it is the only way for you to improve your knowledge in ZModeler. Don't try to create complex things without having previously learned the basics first. Sometimes we try to create some very complex work without trying it out with simple objects first. Once you have made some good progress in basics, this learning process will allow you to improve the complexity in your work later on.



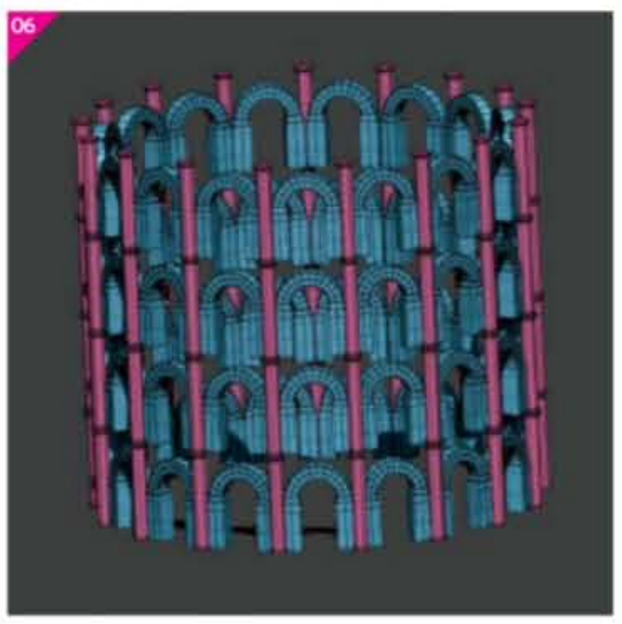
03 Temporary Polygroups ZModeler is a great feature for temporary Polygroups, and to use this feature you need to hold Opt/Alt and select the the polygons that you want to merge into one Polygroup. Select the frontal view of the arch, right-click and select Polygroup (set Target as a single poly) and this will merge the selected polygons into one Polygroup by doing a left-click over the selection. Now, you need to hover over the new Polygroup and select Inset (set Target as a single poly and Modifiers as Inset region) and finally drag and drop.

04 Add bevels In this step we extruded some parts of the column, adding new divisions with the help of Insert. Select an edge, right-click and select Insert. Using this option, all the new divisions will be added perpendicular to the edge. If the edge goes across the x axis, the new division will go across the y axis. Once you have added these divisions, you can use Extrude action by selecting a target as PolyLoop. Now it is time to add bevels so just right-click over an edge and select Bevel by using a target of 'EdgeLoop complete'.



05 Make the column It is time to create this column and we need to use the same process as the first step, but in this particular case we used QCyl Y and you can find this in Initialize. Then, using QCube you should follow the same process used in the first step and add new divisions with the help of Insert by selecting an edge. Now you can extrude some areas of the column using a target as PolyLoops to add more details in the columns. Also if you want you can replace this column for a square column.

06 Animate Array Mesh Once we have created the arched door and column, it is time to merge both SubTools into one SubTool, so go to Array Mesh and activate it. Go to LightBox>Array Presets and select the circle preset. Now change the repeat number according to your personal tastes, click on Pivot and move the Z amount until you get all objects in contact. The previous processes created the 'Transform stage 1' and once you get the desired shape, click on Append New and set Repeat as 4. Then activate Offset and change the values of the y axis.



NUKE

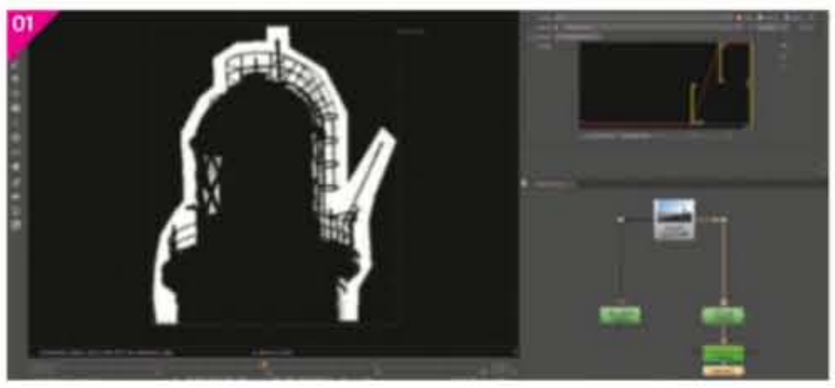
Day for night conversion in NUKE

Day for night (DFN) conversion involves shooting a scene during the daytime that is supposed to be set at night, and this dates back to the early days of film-making. Generally it's achieved by underexposing the image in camera, then calibrating the white balance to yellow to blue up the shot and colour correcting the footage in postproduction to sell the shot.

The location of the Sun is an important consideration; this light source will transition to become moonlight. With overcast footage, ensure there's no Moon as there won't be hard shadows on the landscape. Avoid shooting right in the middle of the day when the Sun's at its highest point because that will cause the most problems for you. Try shooting later in the day when the Sun's lower.

For this tutorial a Lumix Panasonic DMC-GH4 with a Leica DG Summilux 25mm F1.4 ASPH H-X025 lens was used to shoot early-evening footage and stills of Portland Bill lighthouse, which we are converting to night. We will use a still image but since the only moving element is the sea, footage is also provided if you prefer to use that since the workflow is the same. We will use night photos for reference and also for sky replacement and for compositing illuminated windows, although you could use your own stock images for this, or simply paint these details.

The lighthouse beam has been made entirely in NUKE by using animated VolumeRays, Colour Correction, Glow and Noise. Being a 2D effect it's not the most utterly convincing approach, especially if used as a foreground effect. But for this tutorial it's far less expensive than re-creating it using 3D volumetrics and accurately modelling the top of the lighthouse for light collision, which would be a better option for a close-up shot. In the film *Shutter Island* for example, the lighthouse was a combination of practical, miniature and digital effects.



01 Pull a Sky Matte Using a Read node, load Plate1. Connect a Roto and draw around the sky as a rough Garbage Matte. Set Output to Alpha and premultiply to rgba. Isolate the sky as much as possible without concerning yourself with overly problematic areas such as the fencing or top of the lighthouse. We will use Rotos and Keyers to complete the Matte. Then we will draw a Roto shape around the top of the lighthouse. Now view the Alpha Channel and then add a Keyer. Adjust the range to retain as much detail as possible. If required, add a Grade after the Keyer and fine-tune.

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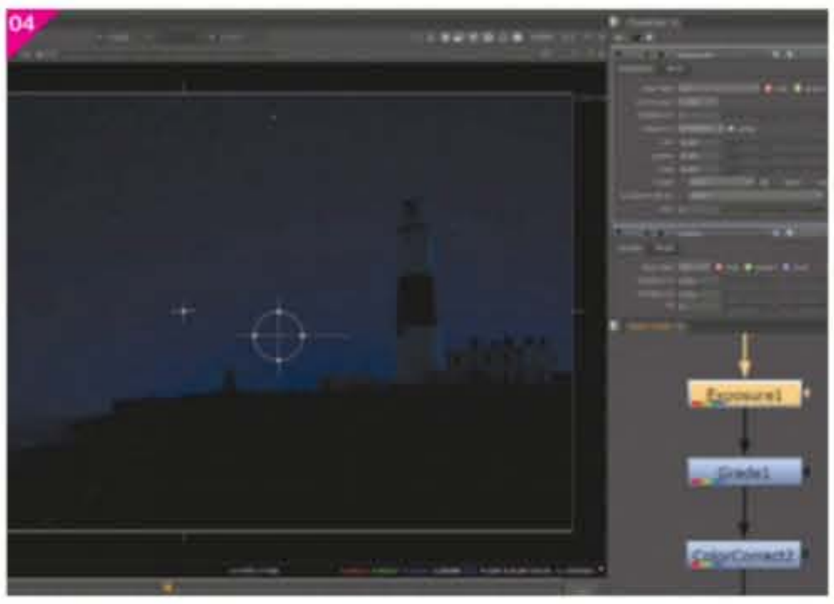
02 Merge Alphas and clean up Continue to Roto and Key difficult sections such as the central fence and terrain, and areas each side of the lighthouse, as required. Once done, we will composite the Matte together. Create a Merge, and set operation to plus. Connect A and B inputs to two different Keyers. Then add further Merge nodes connecting A to the previous Merge's output, and B to a Keyer. Add a Clamp to the final Merge to constrain the Alpha value between 0 and 1. Add an Invert to the Clamp so the sky is black and the rest of the image is white. Use extra Rotos if needed.

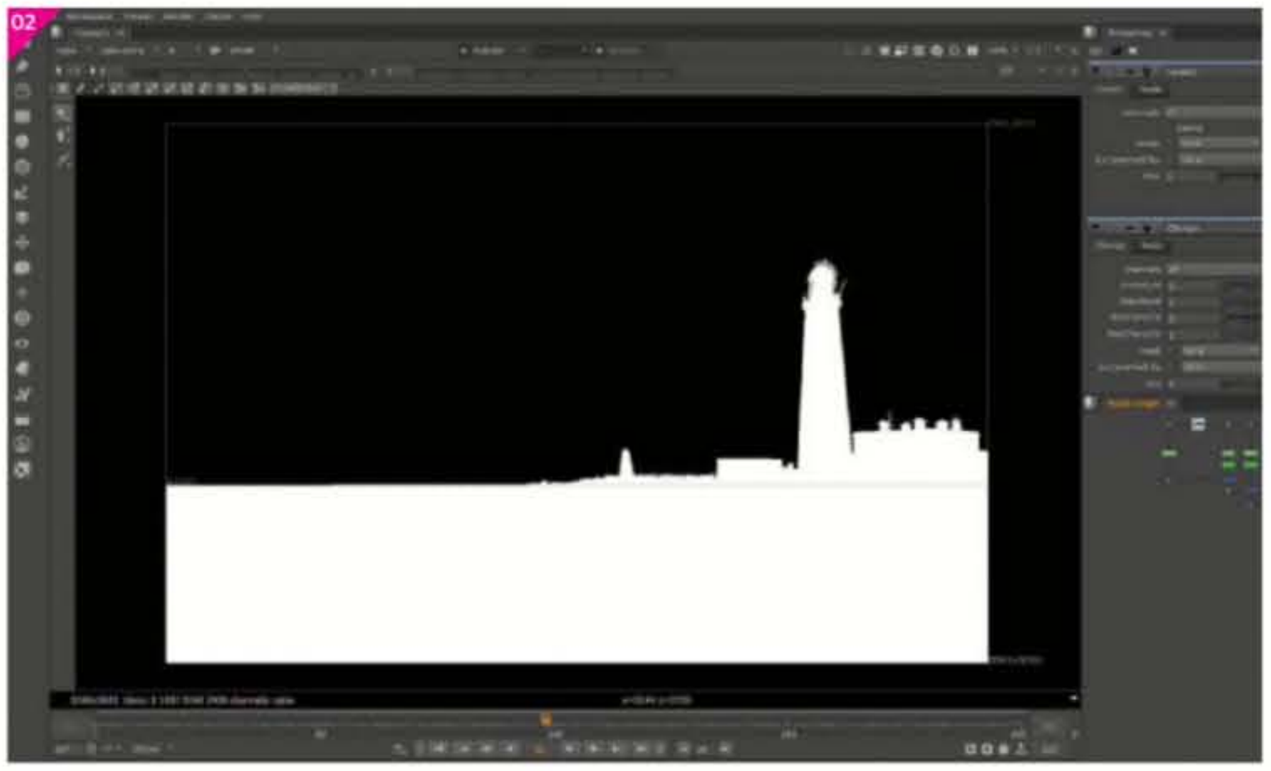
03 Composite the sky replacement Add a Copy node to your Network. Connect A to your final Roto node and B to the Read node to copy the Alpha Channel. Add a Premult node to the Copy. Check the Alpha correctly matches the sky. Next add a Reformat node and set output format to HD_1080 which will be the render dimensions. With a Read node, load NightPlate. Add a Merge and set operation to over. Then connect A to Reformat and B to NightPlate. Add a Crop after Merge (over), set r to 1920, t to 1080 and enable reformat. Add a Transform between NightPlate and Merge (over), and scale and translate as desired.

04 Colour correct the landscape With the sky replaced, we can begin work on the landscape. Add an Exposure node between plate1 and the Copy node and lower the RGB values to around -0.45. Next add a Grade and slightly increase the black point to darken the image. Increase the white point for lower highlights and now lower the gain, which is a Multiply operation. Add a ColorCorrect and lower the saturation. Rods in the retina are responsible for vision at low-light levels, which are black and white, whereas cones are for colour. Adjust the ColorCorrect gain Red to 0.3, Green to 0.6 and Blue to 1.52, to better match the sky.

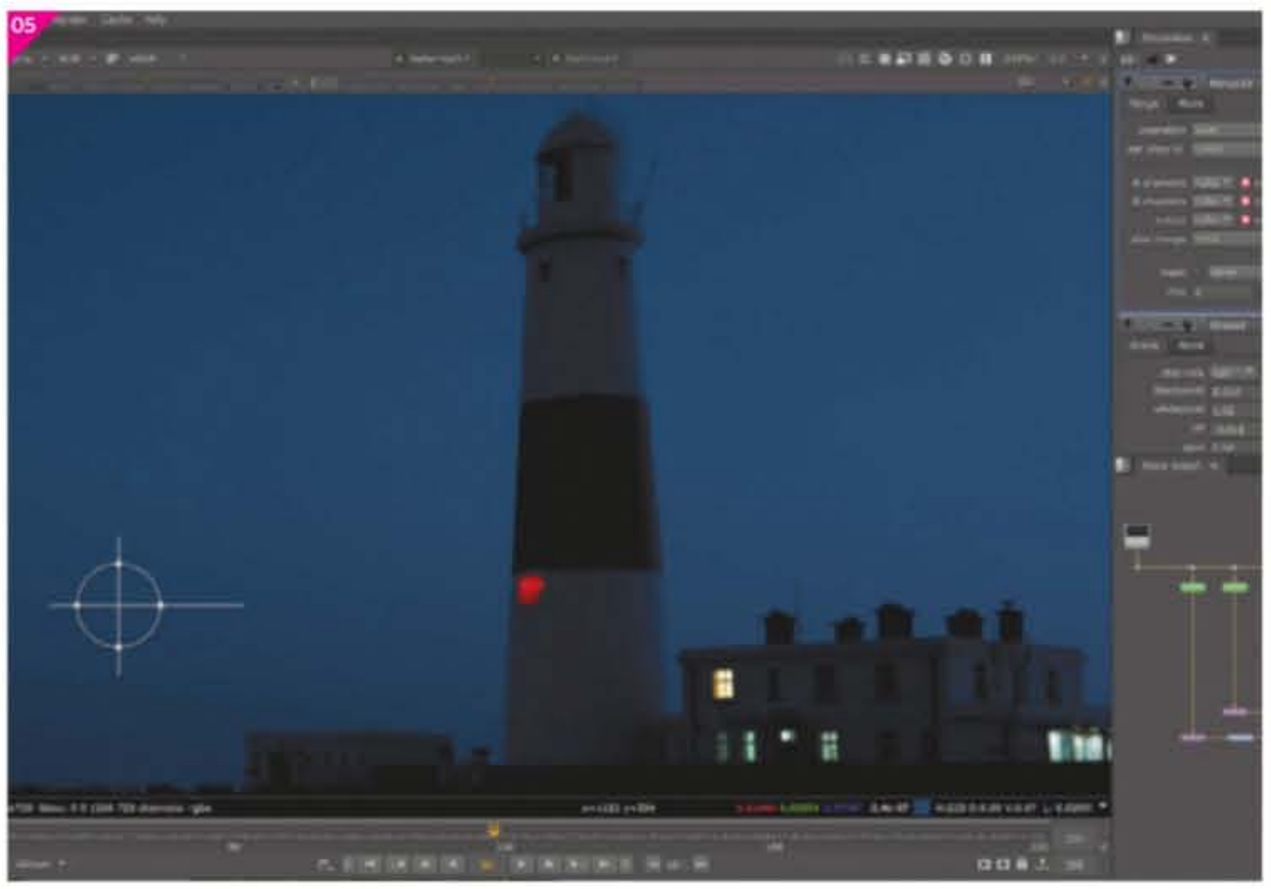


Enhance the shot with elements

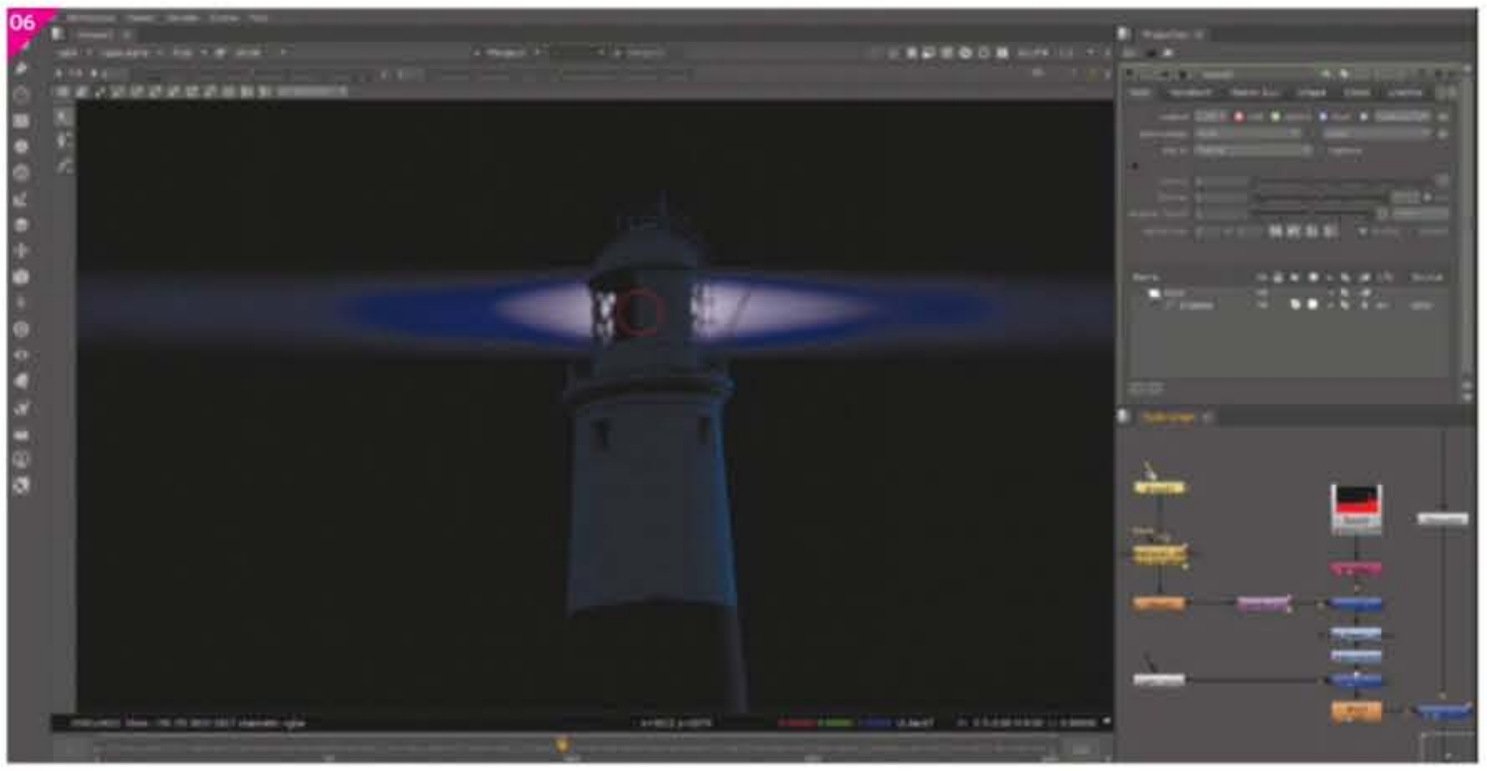
Adding lit elements such as the windows helps further convey the DFN feel. Keeping a collection of elements like this can save you time but you could just as easily paint in these features by creating roto shapes over windows, then adding a Constant node to colour them and Blur, Feather and Grade if needed, then Merge (over) into your network. Alternatively, you could also simply use a RotoPaint node and paint the light sources for a less even and more organic look. Adding glow or animating the light turning on or off can further enhance the shot's believability.



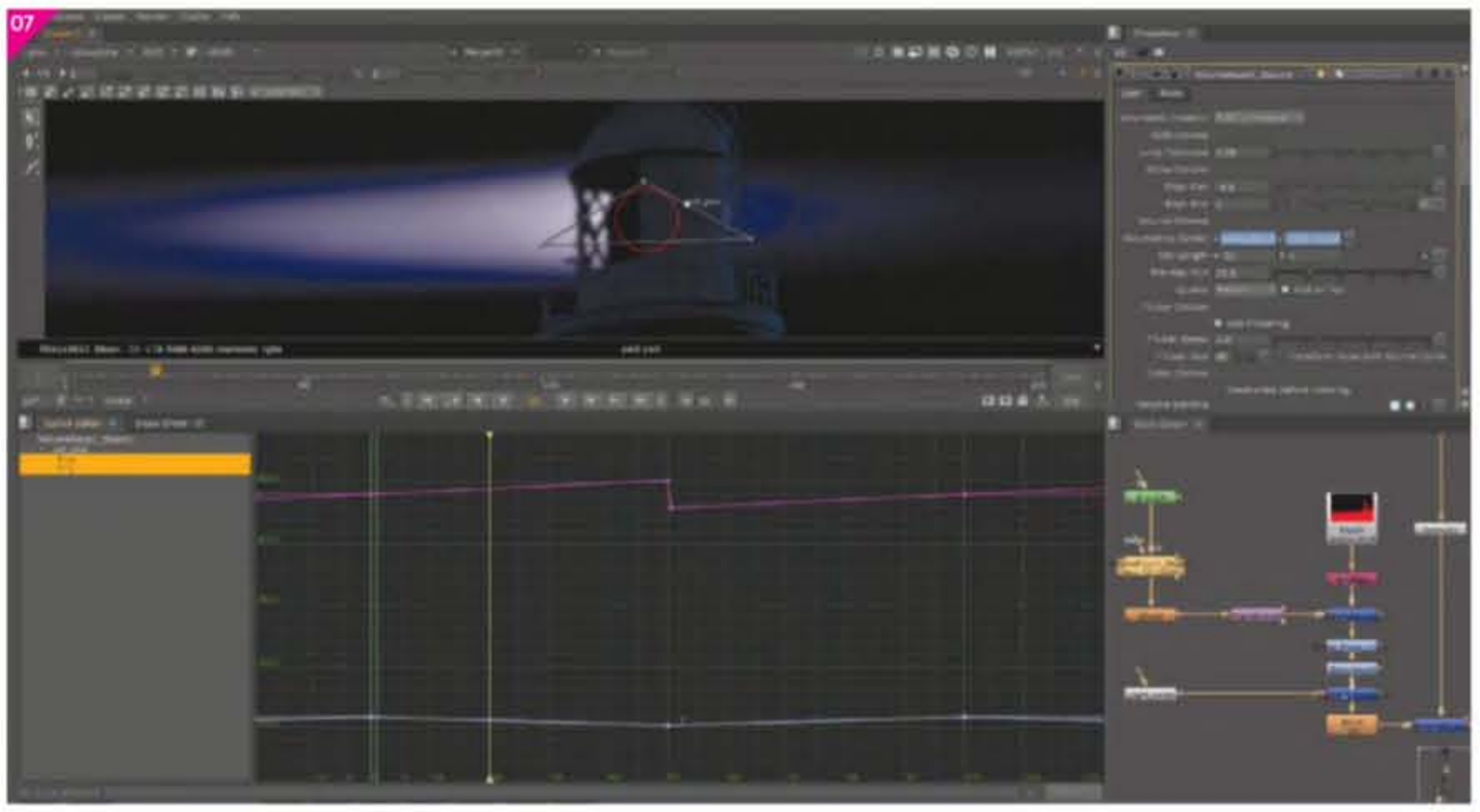
05 Add window elements Creating the appearance of lit windows and lamps is easy enough and helps set the mood. We will use photos to add lights but there are other alternatives (see boxout). Using a Read node, load Windows. Attach a Roto node and draw around the red-lit window. Set premultiply to rgba, add a Transform node and reposition and scale the light to the lighthouse lower window. If you hold the Ctrl key you can move the pivot only, which can make placement easier. Now scale to fit and add a Merge node after premult, connect A to the Transform. Now repeat for the other lights.



06 Add VolumeRays Add a Roto and draw an Ellipse for the lighthouse beam light. Add VolumeRays and connect the Roto to its img input. Move the vol_pos to the Ellipse centre, connect a Glow and a Merge and set it to Out. Plug its B input to the last Roto before the Copy. Add a Merge set to multiply, and connect a Noise to its A input and B to the Glow. Add a Merge after the premult set to plus and connect its A input to Merge multiply. Moving the vol_pos controls the direction of the beam. Adjust VolumeRays and Noise settings to alter the beam's look.

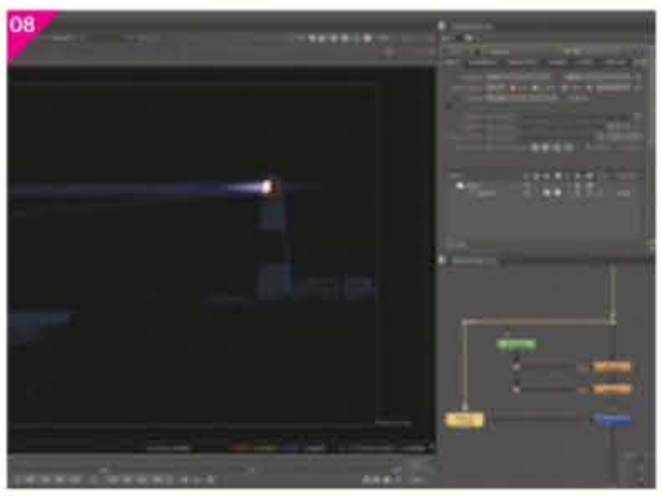


07 Animate VolumeRays To create the illusion of the lighthouse beam rotation we will animate the vol_pos. At Frame 1 place the vol_pos above the Roto Ellipse and set a key frame. At Frame 50, move it to the right of the Ellipse, and below it, set a Keyframe. At Frame 51, move it left – the same distance from the Ellipse. At Frame 100, return it to its location at Frame 1 so the animation can be looped. In the Curve Editor tweak the key frames and interpolation as desired, you can also select the key frames, right-click and choose Predefined>Loop.



Lighthouse beam considerations

Lighthouses have more than one beam (usually four) and using VolumeRays which is a 2D effect makes that difficult to cheat. You can copy and paste the network so there are multiple beams, and offset the animation and then tweak the vol_pos y so more than one beam is visible at once. Alternatively add a Transform after the Glow and animate the rotation. It's worth keeping in mind that in this tutorial the lighthouse beam animates quickly but a beam can take 20 seconds to rotate in a real lighthouse, therefore, depending on your project, this may not be an issue.



08 Add Lighthouse Glow Add a Glow and Blur after the VolumeRays Merge (plus). Connect a Roto to Glow and Blur's mask inputs. Draw a shape around the lighthouse where the lighthouse beam comes from and Feather as desired. Roto areas you want to catch light from the beam such as railings and features in the beam's pathway. Add a Dot above the Glow by holding Ctrl, clicking the yellow dot and connecting a Roto. Draw the area you don't want to be affected by the Glow and Feather as desired. After the Blur add a Merge (over), and connect A input to the Roto.

09 Optional details and rendering At the end of the network add a Write node. Click the folder icon next to file, and choose a destination to render to. Enter name.###.(file format) for example like Lighthouse.###.tiff then hit Render, choose the Frame range and hit OK. In this tutorial we have touched on several techniques but there's plenty of scope to develop the shot further, especially with the lighthouse beam (see boxout), which is adequate for a midground/background element, but for a foreground/close-up shot you'd want to model and light the top of the lighthouse in 3D and then composite it.

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CINEMA 4D, V-RAY, PHOTOSHOP

Texture wool in Cinema 4D

The idea for this tutorial comes from an amazing video tutorial from 3D artist Pingo van der Brinkloev (**vimeo.com/71370784**). Before seeing this video, we had no idea that this kind of effect was possible in Cinema 4D for achieving such a realistic knitting look. You'll see that this technique is awesome and that's all because it enables you to produce a cool image, with fast and realistic rendering.

For this tutorial, we decided to take this technique and to transpose it into space, with the creation of knitting planets.

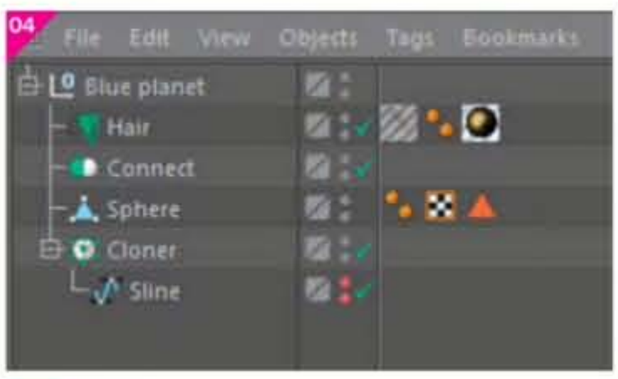
We will start by creating the shape of a hook, then add some helix shapes that will go along it and are crucial for carrying fur, then we will add a Cloner object to produce the knitting pattern. We will then take a look at how we can achieve a realistic look with our knitted wool to produce a great final image.

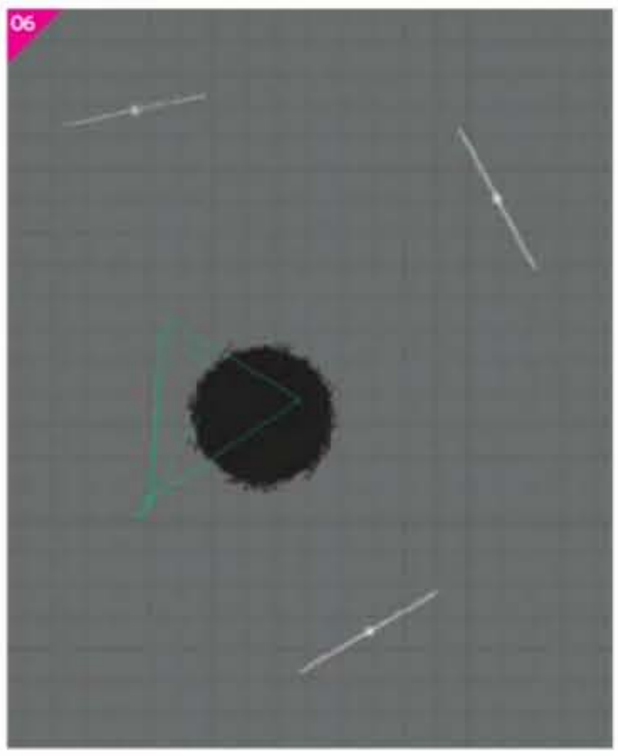
01 Create the shape of the hook We need to create a seamless shape that we can replicate to make the knit pattern. You can use Illustrator to make the shape, or you can do it easily with the help of the grid and the Linear Spline tool (work in top view for this). Enable the snap with grid option, draw with few points, then select all your points and do a soft interpolation on them. Tweak them a little bit to be close to any reference images you may have, add symmetry and you're done.

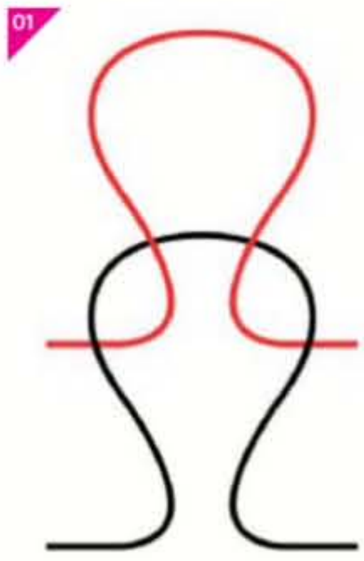
02 Wrap helices onto the hook To achieve this result, you need to first select the helix shape in the Spline menu and put the values detailed in our screenshot to create a wavy look. Then create a null object that will contain the helix and add a Spline Wrap Effector. Then, correct the axis (z axis in our case) so that the helix follows the hook. Now duplicate the helix three times and add a rotation of 90 degrees for each so that we end up with four twisted splines.

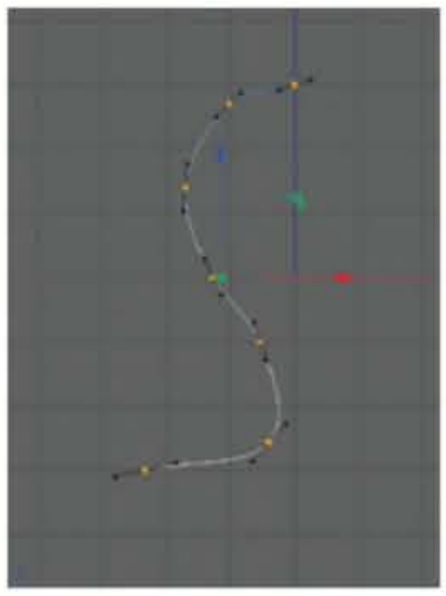
03 Create the pattern and apply it to a sphere shape Merge the helices together. Add a sphere and then add a Cloner to your scene with the helix spline as a child and put it in Object mode. Choose your sphere as the object of the Cloner and set the distribution to 'Polygon Center'. Now your knit pattern is covering your sphere. You can now hide the sphere, only its shape is needed.

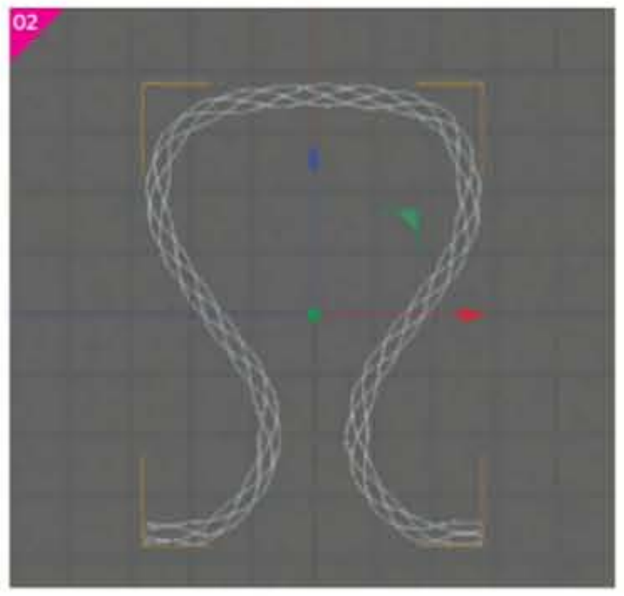
04 Add fur To achieve a realistic look, we will need to add in some fur. To put fur onto the Cloner object, you must create a Connect object (in the Modeling menu) that will be the bridge between your hair and your Cloner. In the Connect object, assign your Cloner to Objects. Then in Hair, assign the Connect object as the link. You are then free to tweak the length, thickness and volume of hairs you need, with the hair material and the hair parameters.

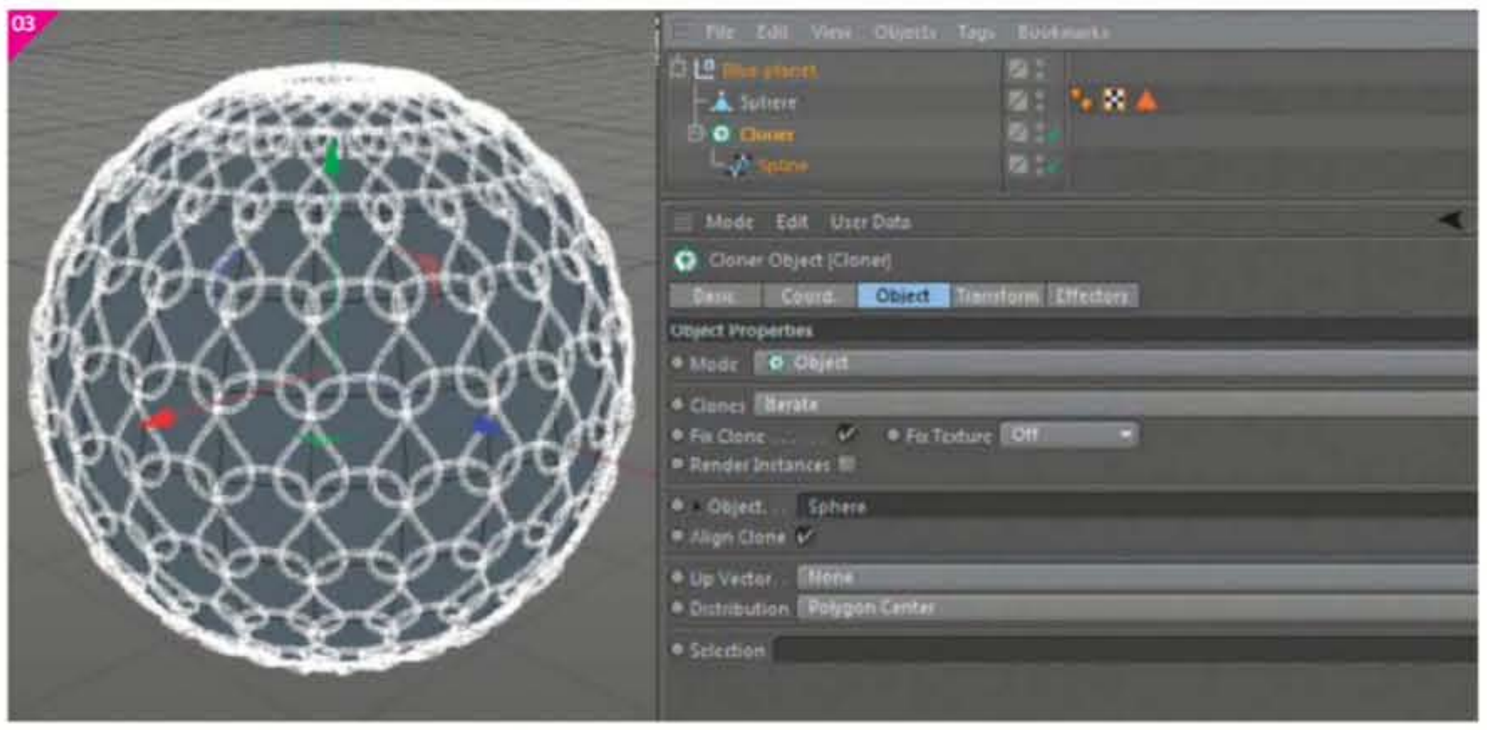










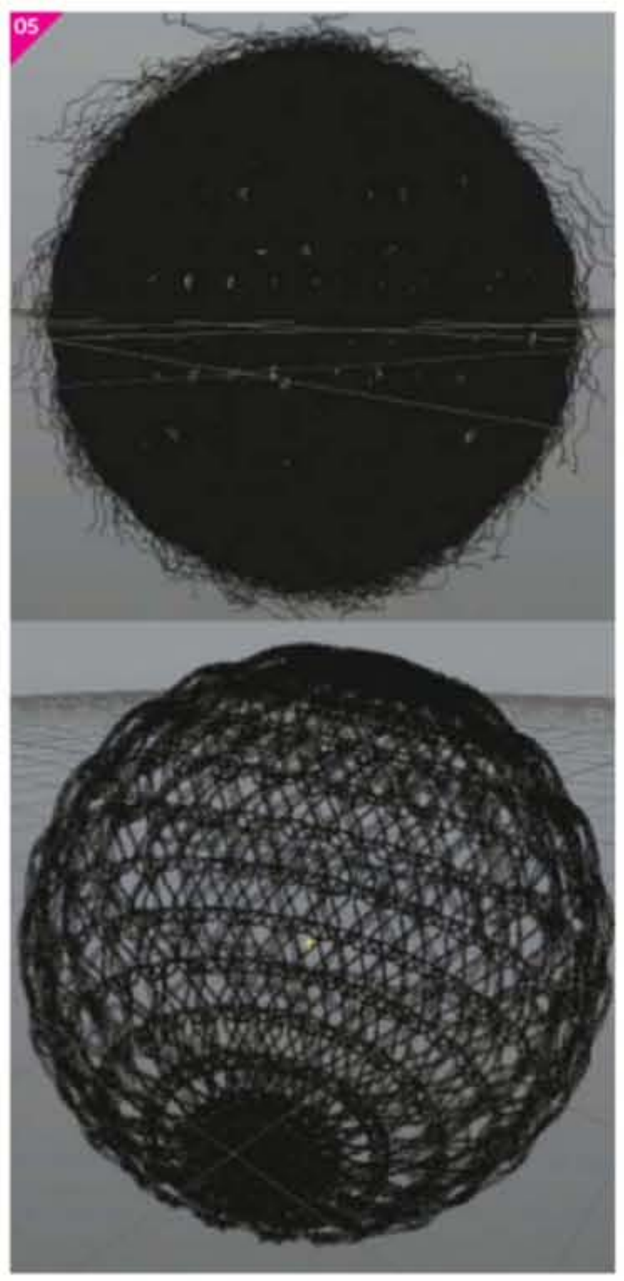


Hair is beautiful and tricky

Be careful with the number of hairs you choose to avoid slowing down your machine, or worse. Try to start with a low number in the count roots of the guide hair menu and in the numbers of hairs, and fill in the gap with the Cloning menu with 20 or more in the clone. Then increase the number of hairs until you're satisfied. Keep in mind that segments are crucial to have a good look with detailed hairs.

05 Create the planet Now, duplicate your Hair object and change the hair materials. Try to have one Hair object with most of the hairs having slight variations, and two or three Hair objects with less hairs that are way more wavy. Use Kink and Freeze to add variation. Create a smaller sphere with hairs and turn it a little bit, so that we have several layers of fur with different colours. Set colours for your fur, one colour per planet. Now you're done!

06 Create the scene For this image we chose to make two planets, one of these will have a ring (using the same technique). We used three-point lighting to keep some darkness and to highlight the strokes full of fur of the planets. In V-Ray, we put numbers in the MatID in the V-Ray Hair Materials to be able to cut out the hair from the background in Photoshop. We added a starry sky background, some depth of field and some colour correction to produce the final look.



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CLEAN UP YOUR MACHINE

It might seem a little elementary, but we can't stress enough how important it is to keep your workstation in top shape

Computers tend to become quite clogged up over time, with an abundance of temporary files, cookies, start-up applications and more putting more pressure on your machine and becoming detrimental to performance as a result. However, it doesn't take a lot of effort to get on the right track – there are several things you can do right now to clean up your computer and boost performance. Bear in mind, though, that you should always back up all of your files to an external drive and keep your system repair disc at hand.

GIVE IT A CLEAN

It might sound silly, but problems can occur if you let your workstation become extremely dusty. You may have seen the inside of a workstation before, but if you haven't, pop the side off of your machine and you'll be amazed at how much dust gathers in your tower! Clean out your machine as often as possible, especially if it's located under a desk or in the corner of the room. Buy a can of compressed air to get the fluff out of your computer and pay attention to any fans – air circulation is critical! Word of warning – don't use a vacuum cleaner!

RESTART YOUR MACHINE

Even after you've closed an application some residual tasks and, crucially, memory usage will remain. Restart your machine on a regular basis, as this will help you to avoid memory leaks and will unclog portions of your computer's memory, too. On top of this, as you know, your operating system automatically updates on a fairly regular basis; these updates require a computer restart to take effect.

CULL UNWANTED PROGRAMS

This is perhaps the most obvious solution when it comes to optimising performance, and yet it's really easy to forget to do! Head to Start>Control Panel>Programs>Uninstall a Program and browse through the apps that are stored on your computer. You may find that many of them are unnecessary, so select the offenders and hit Uninstall Program. Be careful, though, as there are many apps that might not seem necessary yet do important things. If you're unsure, ask a professional for advice.

KEEP YOUR DRIVERS UP TO DATE

This might seem a little complicated, but in fact it's very simple. Essentially, hardware works with a set of drivers per component, and these can sometimes be out of date without you realising. Most drivers will update automatically if you have a working internet connection, although occasionally they won't and will need further action. Windows comes with a basic set of drivers, but for 3D applications, pay attention to graphics drivers and chipset drivers. Visit your 3D app's certification page to check you have the right drivers – be warned that these won't always be the most up to date. AMD offers a full set of up-to-date GPU drivers for its FirePro range at **support.amd.com**.

TURN OFF UNNECESSARY START-UP PROGRAMS

Every time you boot up your workstation there will be several programs that launch automatically and continue to run in the background, sapping performance in the process. Head to Start>All Programs>Run and type in 'msconfig'. Click the Startup tab and you'll be faced with a long list of processes that initiate as soon as your operating system boots up. Some of these will be fairly unnecessary, such as proprietary software/ hardware features that don't really do much, but be super careful when deselecting anything – you can do more damage by deselecting the wrong processes. Double-check before removing anything.

DELETE UNNECESSARY FILES

If you're working on multiple VFX projects or store a lot of files on your computer, your hard drive will fill up pretty fast and slow down your machine. This can be a problem with many SSDs (solid state drives) as the price per GB of storage is higher than a traditional hard drive and therefore most SSDs are smaller. You can do this by deleting any installation packs on your drive. Apps like Maya, for example, will leave behind residual installation files that can be quite large. Double-check that the app still works before deleting permanently though! On top of this, right-click on the drive that you want to clean up, select Properties and then Disk Clean-Up. This in-built Windows tool will rid you of temporary internet files and other clutter.

DEFRAGMENT YOUR HARD DRIVE

This is a simple way to increase your hard drive's performance, but bear in mind that doing this to an SSD will not improve performance – it may even reduce the lifespan of the drive. Hit the Start button and open the Disk Defragmenter. Under Current Status select the disk that you want to defragment. Click on Analyze Disk to ascertain whether or not the disk requires a defrag then click Defragment to begin the process. Even server architecture benefits from this, so keep defragmentation in mind.

> "Restart your machine on a regular basis, as this will help you to avoid memory leaks and will unclog portions of your computer's memory"

SET TO MAXIMUM PERFORMANCE

There are different power profiles that you can set Windows to depending on whether you're after

high performance at the cost of economy or vice versa. By default, Windows will be set to Balanced, giving you a nice mix of both. If you're after better performance, head to Start>Settings>Control Panel>Power Options. Then click on 'Show additional plans' and set to 'High performance'.

REDUCE ENCRYPTION AND COMPRESSION

Files are encrypted and compressed in order to save disk space and to increase security. Turn these features off to enjoy higher performance.

SET CPU AFFINITY

Whether you're working in a 3D application like 3ds Max or Maya, or video editing software such as Adobe Premiere, rendering operations really take it out of your processor (CPU). You can, however, assign different processes to specific cores (the nuclei of your CPU) to free up processing power. Hit Ctrl+Alt+Delete to open up the Task Manager and select Details. Right-click on the process that you'd like to adapt and click on 'set affinity'. This will let you adjust how many cores inside your CPU are assigned to rendering something out through V-Ray for Maya, for example.

HYPER-THREADING

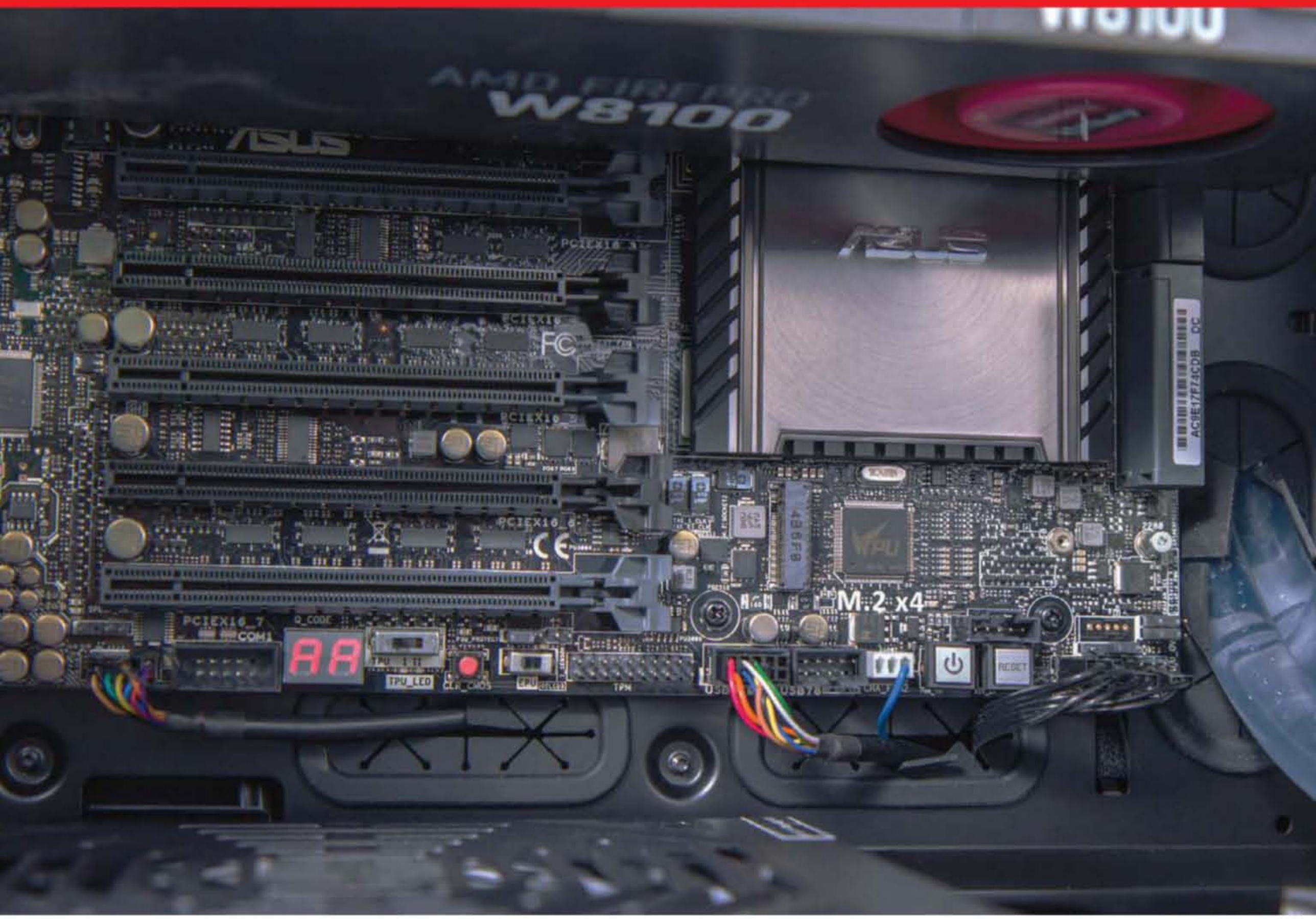
Intel Hyper-Threading technology creates two virtual cores from each physical CPU core to increase performance and can be enabled or disabled in the BIOS. Enabling Hyper-Threading can boost performance in multithreaded applications, like ray-trace rendering, but can slow other procedures. If you're unsure, check with your software supplier or use a utility like the Dell Precision Optimizer which automatically adjusts settings depending on the software you're using.

ABOVE By having a really good clean up of your workstation you're bound to increase performance. Make sure you're regularly restarting and cleaning up your disk drives, too

Key tip

DISABLE INTEL C-STATE AND SPEEDSTEP

In an ever-more power conscious age, manufacturers are working hard to ensure that unnecessary power consumption is avoided wherever possible. While this might be a priority for you as well, it's worth noting that Intel SpeedStep and C-State both adversely affect the performance of your workstation if they think that the machine is idling. Turn these off to avoid unnecessary sluggishness. Be warned, though, that carrying this out is quite advanced as it requires diving into the BIOS – do not attempt this if you're unsure of what you are doing as you may harm your computer.



TIME TO UPGRADE

Although it might seem like an arduous task, buying and installing new workstation components isn't exactly rocket science, and it's absolutely critical over time

More often than not, the inside of your workstation fits together a bit like Meccano – all you need is the know-how and a screwdriver to remove and replace most of the components inside your tower. Whether or not you built your workstation from scratch or you bought it from a manufacturer or reseller, there's absolutely nothing stopping you from investing in some beefier components to achieve better results from concept work through to the final render.

GET YOURSELF SOME PROFESSIONAL GRAPHICS

We often speak to artists that have to run two or more gaming level GPUs in their workstation in order to achieve decent performance in the 3D viewport. Get yourself a professional card, such as those from AMD's FirePro range, and you'll instantly see the difference, especially when working within a complex scene or making changes to a high-poly 3D model.

As an example, upgrading your generic GPU to a professional solution (such as the AMD FirePro W7100) shows up an average frame rate score in Autodesk Maya of 192.217fps – and this is on the basis that you're working on a model with a poly count as demanding as over 500,000 polygons! Solid frame rate scores across the board in Maya and 3ds Max more than prove the power of a professional graphics solution like AMD FirePro, as you can see in the results on the right.

> "Solid frame rate scores across the board more than prove the power of a professional graphics solution like AMD FirePro"

Other things to bear in mind are compatibility and power consumption. Firstly, make sure that the GPU that you're buying is fully compatible with your workstation. PCIe 3.0 cards will not work to their true potential in PCIe 1.0 workstations. Secondly, older or cheaper power supply units (PSUs) will struggle to output enough power to run a modern professional GPU. Look for a PSU with a high wattage and auxiliary PCI Express power connectors.

BENCHMARKS

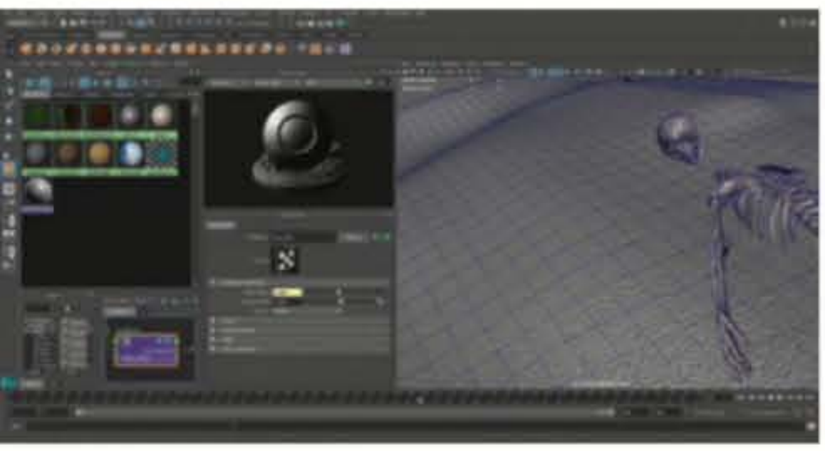
It's all well and good just shouting about graphics card performance – you need benchmark results to really gauge the power of a professional AMD GPU

3DS MAX 2016 FPS

521664 Polygon model from Male Head Scan, camera animation over 1,500 frames in one viewport in realistic viewport with 10K TIF image texture

MAYA 2016 FPS

521664 Polygon model from Male Head Scan, camera animation over 1,500 frames in one viewport in realistic viewport with 10K TIFimage texture



ABOVE LEFT Complex scenes that make use of materials when rendering require more processing power, as it's the CPU doing all the work

ABOVE RIGHT If your sole focus is modelling then you don't need to worry too much about having a ridiculously powerful CPU

ABOVE Upgrading to a professional graphics card, such as the AMD FirePro W8100, is essential if you're working in demanding 3D applications

RIGHT The AMD FirePro W7100 recorded excellent frame rate results in our benchmark tests, and is useful for a variety of GPU intensive tasks

Key tip

MIGRATE WINDOWS TO AN SSD

Many of you will no doubt be familiar with the fact that migrating your operating system to an SSD from your hard drive will increase boot speeds significantly, meaning no more waiting around for your computer to start up, and in a more tangible sense doing this will free up precious space on your hard drive, further boosting performance. SSDs are much quicker at reading and writing data, so your workstation should feel more responsive in general after installing one. Find out from a reputable PC/tech website or a professional what you'll need to do to safely migrate your OS, as you need to be careful not to improperly clone your HDD.

MORE CPU POWER

If you're in the market for a new CPU, the two things you need to bear in mind are frequency (measured in GHz) and how many cores the thing has. All applications will benefit from a processor with a higher clock rate (GHz), and picking up a new processor with a higher amount of cores will highly benefit multithreaded tasks such as rendering or simulation (including Bïfrost effects in Maya).

Something to remember is that some CPUs aren't compatible with certain motherboards, so do a bit of research before investing. Also, ensure that you've got the correct heat sink/fan for your processor and use a good quality thermal paste to attach your heat sink to the CPU.

GRAB MORE MEMORY

A decent amount of random access memory (RAM) is crucial for any demanding tasks, such as modelling, texturing and rendering a 3D model or scene. Luckily for you, upgrading your RAM capacity is pretty much the simplest part of upgrading a workstation and one of the cheapest, too. But why is it important? If your workstation runs out of available memory the system can slow down completely due to hard drive caching. Get online or to a computer shop and sort yourself out some more RAM – it barely costs anything and you'll be pleasantly surprised by the results!

BUY A NEW DISPLAY

This one is pretty self-explanatory, really. We're at the stage now where Full HD (1920 x 1080) is pretty much the standard resolution for low-end monitors, some of which cost less than £100 and still offer a crisp display. However, nowadays you've got 4K monitors (3840 x 2160) and 5K monitors (5120 x 2880) to consider. These displays are insanely detailed, but you're not going to see much difference unless you're rocking a 32-inch screen or more. Bear in mind that high-performance displays will sap more juice out of your GPU, so bear this in mind before splashing out too hastily – the same goes for running multiple monitors simultaneously, which many artists do.

BUY A NEW WORKSTATION

You might decide that, instead of working with what you've already got, you need to invest in a shiny new machine

Whether modelling, texturing, compositing, simulations, lighting and rendering or otherwise is your poison, there's bound to be a workstation out there that will adequately satiate your needs. We've put together a guide to help you to decide on the best workstation solution for you, covering each of the major components and explaining what they mean.

GRAPHICS PROCESSING UNIT (GPU)

Professional GPUs, much like the AMD FirePro range, offer the performance and quality that are essential for VFX enthusiasts and professionals, as they are tested, optimised and certified to work with leading CG applications such as Maya and 3ds Max. Whether you're adding effects to a short film, animating a character, building high and low-poly assets for a videogame or otherwise, a professional graphics solution is definitely the way to go.

The mid-range AMD FirePro W7100 performs extremely well in both Maya and 3ds Max when faced with a high-poly asset. For even more intensive procedures or for artists using multiple monitors displaying multiple viewports, the AMD FirePro W8100 and W9100 offer staggering GPU performance. A more powerful graphics card with more memory can help with smooth model manipulation in exceptionally large 3D models or particularly when using advanced view features.

When buying a workstation try to find a good balance between CPU and graphics card. A high-end graphics card such as the FirePro W8100 or W9100 will not be able to express its true power if the CPU you're using runs at a low clock rate.

Higher end graphics cards can also offer additional benefits. A single AMD FirePro W7100 can connect to up to four 4K displays, meaning that navigating between different viewports when building a 3D scene is a breeze. This is made possible by AMD Eyefinity multidisplay technology, which is also available in other professional GPUs. The FirePro W5100, for example, features four discrete display outputs, while the top-end W9100 features six outputs.

GPUs can also be used to accelerate compute intensive tasks such as ray-trace rendering – the tasks that are usually carried out by CPUs. For ray tracing, the AMD FireRender plugin delivers interactive photorealistic rendering functionality in major software applications with AMD FirePro W-series GPUs.

CENTRAL PROCESSING UNIT (CPU)

Modern CPUs comprise multiple processors known as cores. When there was only one core per chip you had the choice of a single or dual processor workstation. Now things are measured in single or dual sockets and the number of cores per socket. On a single-socket workstation four cores are common, but this can extend as high as 36 cores in a dual-socket workstation, which obviously offers crazy levels of performance. It's worth remembering, though, that clock speed is also extremely important when deciding on which brain you're after for your new machine.

Your choice of CPU will also depend, ultimately, on your discipline. If you're a modeller through and through, then it's likely that you'll be able to work with a decent single-socket machine. If your game is dealing with materials, particles and really advanced simulations/FX then a dual-socket machine is a must. It's all common sense, but an important decision does need to be made. It really isn't worth buying a two-socket machine if you're only going to need one, as upgrading later can be really tricky and is very expensive.

Ultimately, when buying a new workstation, have a think about what levels of performance you really need, as opting for top-end processors, such as the high-end Intel Xeon chips, can set you back a fair amount indeed. You may find that if you're only spending time doing postproduction work such as roto or little touchups then a monster machine isn't for you and neither is a super expensive CPU. However, if you spend an awful lot of time performing several tasks at once or deal in extremely complicated simulations or heavy rendering operations then bear in mind that you'll need a CPU that can handle them. Once again, consider the power of your graphics card, as this will, in some cases, dictate how much processor power you're better off opting for.

> "A more powerful graphics card with more memory can help with smooth model manipulation in exceptionally large 3D models or particularly when using advanced view features"

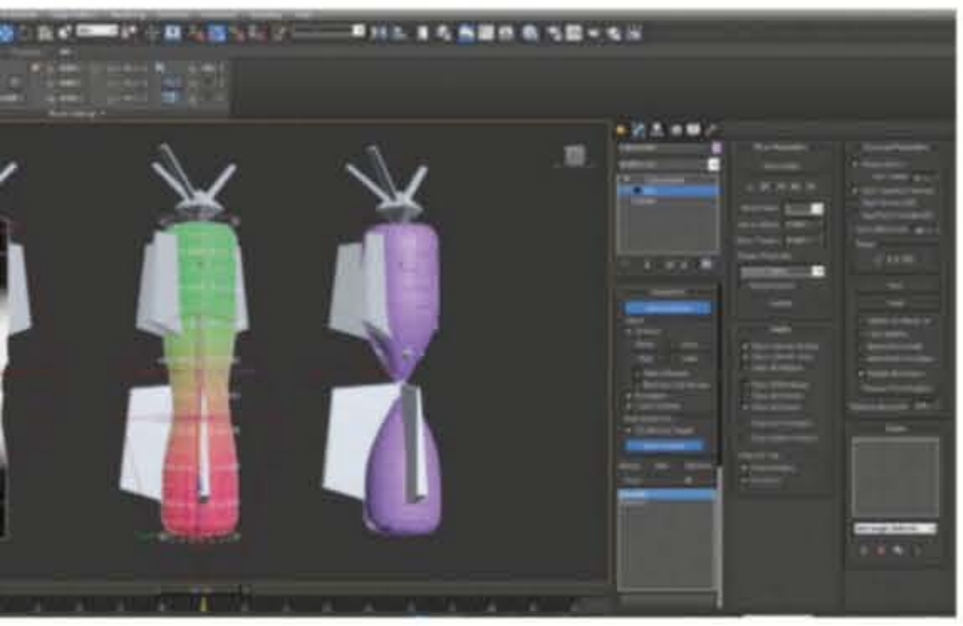
3DS MAX SCALING

Of particular note is the scaling that takes place when using an AMD FirePro card for intensive 3ds Max tasks. When running a 1,500 frame animation of a model at 521,664 polygons, AMD FirePro cards achieve excellent frame rates from the bottom upwards, with the high-end W9100 reaching a staggering frame rate of 126.

STORAGE NEEDS

With the effectiveness of SSDs and their potential performance boost, it's a component worth thinking about when buying a new machine, as an SSD is pretty essential if you're working in 3D. By installing your operating system on an SSD and keeping all of your 3D scene files, video footage and more on a separate hard drive your machine is likely to perform better. SSDs have far quicker read/write times than HDDs, although keep cost in mind – SSD real estate is far more expensive than that of an HDD, meaning that it costs more per GB of storage.

As an example, in tests the boot speed from a 1GB 7,200rpm HDD with a 3.4GHz processor was 67 seconds. Replace that drive with a 250GB SSD plugged into the same SATA slot and the same boot speed fell to only 22 seconds.



LEFT When buying a brand spanking new workstation, it's crucial to understand exactly what your requirements will be, based on your area of CG expertise

MEMORY

Due to the complex nature of modern 3D applications and the potential for you to create far more technical models, scenes and effects, buying a workstation with a hefty allocation of random access memory (RAM) is absolutely *essential*. For Autodesk Maya and 3ds Max users we'd recommend a workstation with a minimum of 16GB on-board RAM, preferably with a motherboard setup that will enable you to add two more 8GB sticks at a later date to bring the total to 32GB, should you wish.

THE OPENCL REVOLUTION

Backed by hardware manufacturers like AMD, OpenCL enables popular 3D applications to tap into the processing power of modern GPUs, opening up bold new ways of working

Times have changed, and computing power no longer entirely rests in the CPU. Instead, OpenCL technology has enabled GPUs to carry some of that burden. Modern GPUs pack a serious amount of parallel processing power, enabling a huge variety of tasks to be accelerated by the GPU through the adoption of OpenCL technology.

Due to its growing array of proponents at a hardware level, such as AMD and its FirePro range, OpenCL has been adopted by the big guns of the VFX and digital media worlds such as Autodesk and Adobe, as well as popular apps like Blender and Side Effects' Houdini. Want real-world examples? We've got you covered.

GPUs speed up complex tasks

For eyeon Software, the benefit of GPU computing is simple: raw power. Eyeon was one of the first DCC software developers to support OpenCL, using it to accelerate computationally intensive tasks within Fusion, its professional compositing system.

"With hundreds or even thousands of cores available [on the GPU] we can implement more complex FX algorithms," says Joanne Dicaire, eyeon's executive vice president of sales and marketing. "Deep volume fog takes approximately 40 minutes per frame to render in a 3D renderer. As a GPU version, Fusion's deep volume fog renders at 10 frames per second or faster with full raycasted self-shadowed lighting – unprecedented for a compositing application."

OpenCL opens up new working methods

Cutting computation time from days to minutes means that VFX facilities can take on jobs that would have been impossible with the CPU alone; eyeon has experienced this first hand.

"We are working with studios to develop new tools and workflow enhancements, together with GPU and OpenCL optimisations," says Dicaire. "For Roland Emmerich's *Anonymous*, we worked with Uncharted Territory to develop the 3D volume fog system. The budget and time constraints meant the visual effects could not have been done in any other way."

Write once, run anywhere

Unlike CUDA, Nvidia's proprietary parallel computing architecture, OpenCL code is compiled at run-time, rather than precompiled in advance and stored in a binary format inside the executable. This presents its own challenges for developers, but the advantage is that the code can support new hardware right away rather than being reliant on timed updates.

A new way of GPU thinking

With its combination of write once, run anywhere functionality and widespread industry support, OpenCL is opening up new ways for CAD, DCC and simulation software developers to tap into the power of modern GPUs.

Autodesk has implemented GPU support in Maya 2016's built-in deformers. These deformers include SkinCluster, BlendShape and SoftMod, with support planned for further deformers in future updates to Maya.

For Bruce Hickey, Autodesk's software development manager, the work is part of an ongoing industry collaboration: one that will ultimately change how both software and hardware are developed.

"The way that animation is done right now is quite freeform," he says. "We're working with production companies to agree that there's a certain order in which operations have to be carried out. If we can codify that, it will help us see the full potential of the hardware."

Collaboration is key

A close relationship with hardware manufacturers like AMD is essential. "We have a very tight connection with AMD's back-end team," says Hickey. "We're happy to provide the feedback to enable them to get the last ounce of performance out of their technology."

It's a sentiment shared by Autodesk media & entertainment product manager Kamal Mistry: "The performance we are seeing is incredible!" he says. "Calculations happen in real time and frame rates stay high, even when working on complex VFX. I can't wait to see the improvements with the next generation of AMD FirePro cards and how the software will truly sing."

MODO 901

The Foundry's "most significant update" brings with it a wide variety of new and improved features

ABOVE This car was made with MODO 901. Experimenting to get the final shapes was easy thanks to the forgiving subdivision and fast UV tools

BELOW The Fusion tab gives access to tools and viewport settings. QbicPresets have been changed to QbicGeometry and combined with Booleans and selection/drop functions

New software updates are always exciting. Sometimes you have to search through the update docs to look for all the newest and improved features, other times, you have to get used to the new interface by searching for the new additions. Well, all of that is not the case with MODO 901, which brings you a fresh, clean interface that is easy to use from the get-go. Everything is intuitively placed and at first it can feel like a lot of new tabs, but once you sit down and take a closer look you will notice how much thought went into the design of the interface.

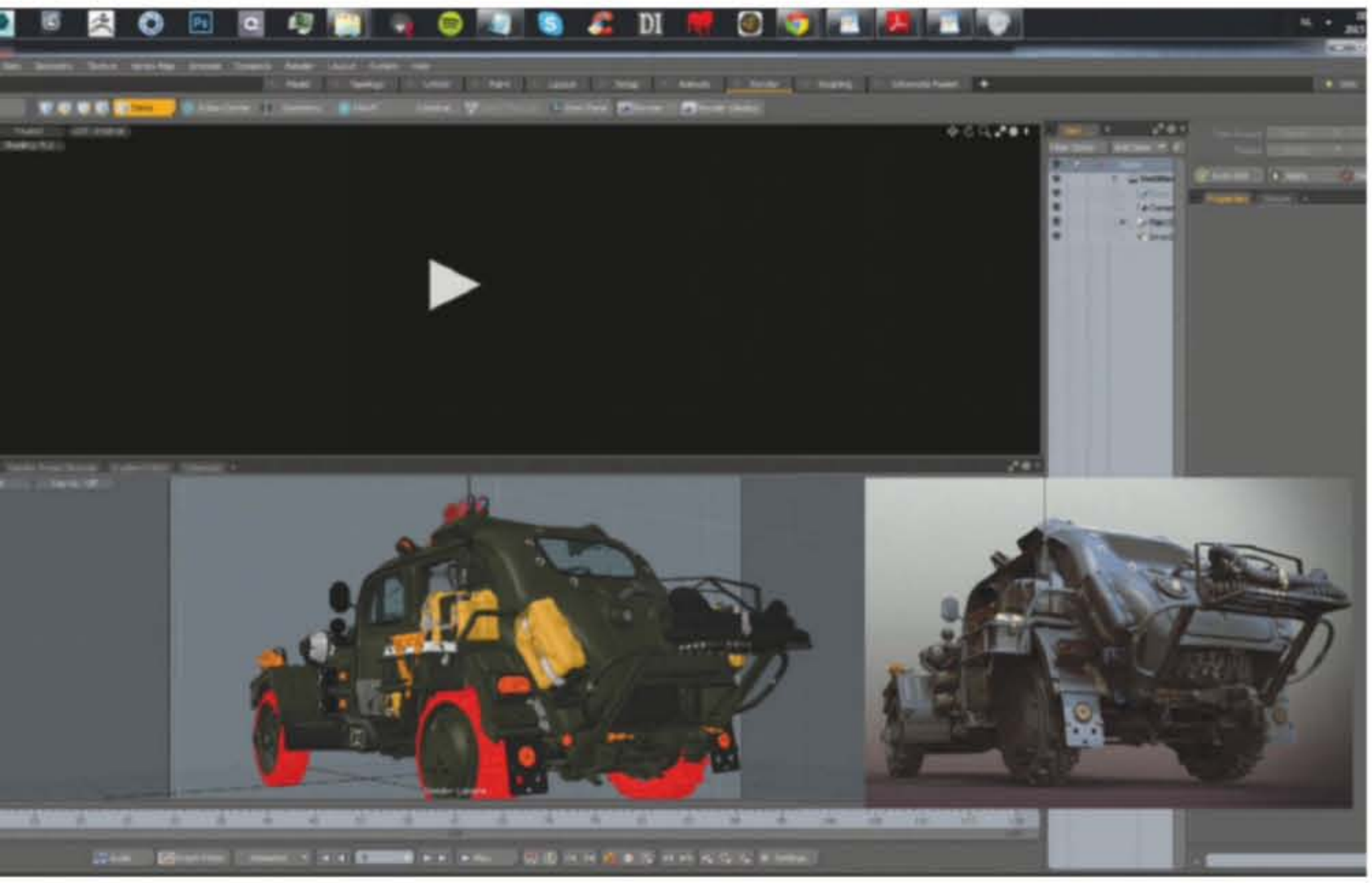
The software itself has everything a designer can dream of – it even has its own sculpting tools that are nondestructive (you are able to toggle them on and off). This was improved even more so with multiresolution layered sculpting – with multiple sculpt layers at each mesh level and the ability to transfer multiresolution displacement vectors between meshes.

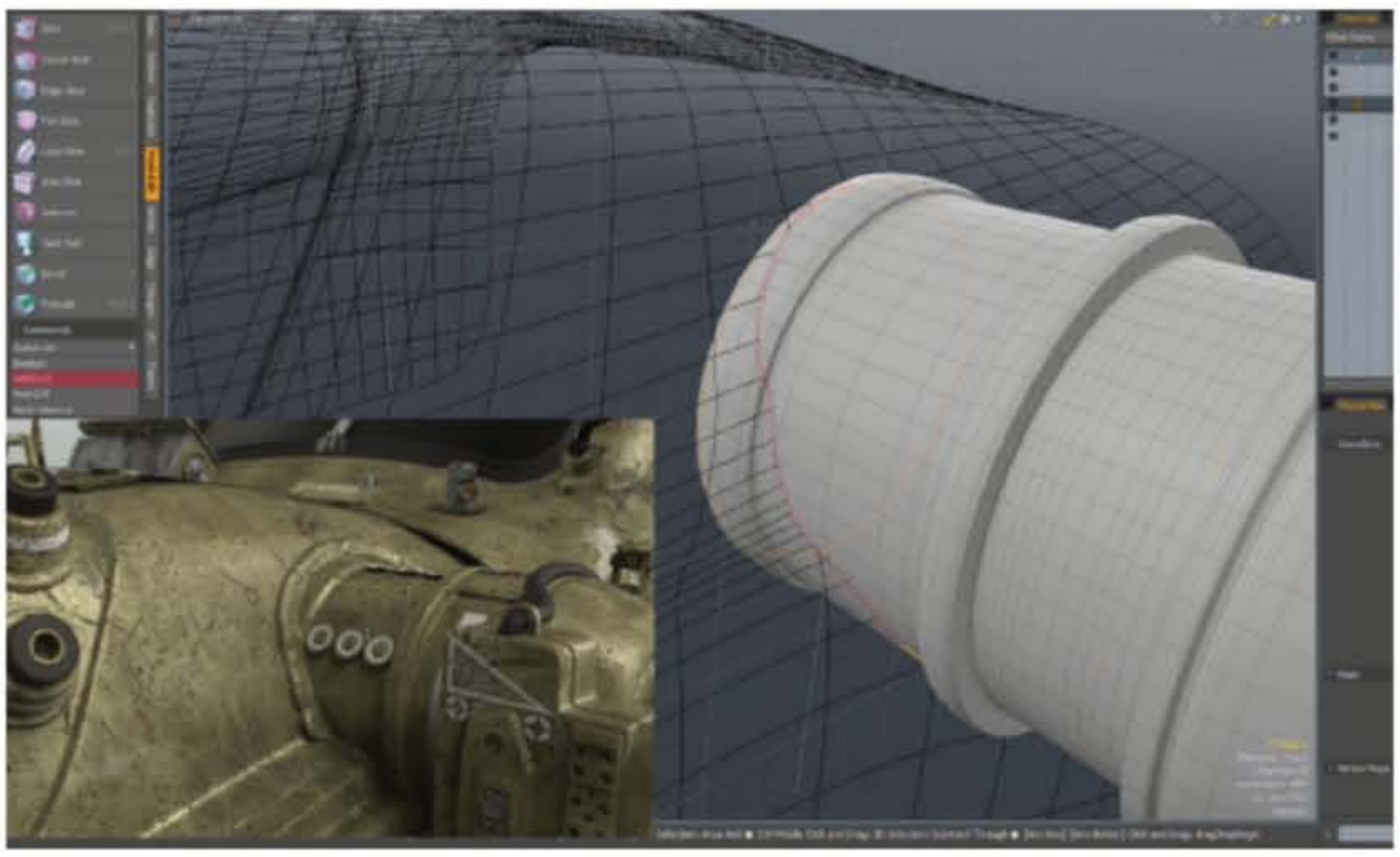
Modelling can't be any faster as you can align polygons, edges or vertices selections into circles (the old perfect circle script), ngon shapes with the new Align tools and the ability to tweak the weight of the effect. With the new Multi-slice tool, MODO lets you cut through multiple polygon fields all at once. The Slice tool, on the other hand, offers new cap options and can slice across multiple edges, and if that wasn't enough you can control Quad Fill and Curve Generator options.

The loop selection has also been revamped: edge loop selection stops tracing connecting edges when it gets to an odd number. This makes it easy to change your behaviour on the fly during loop selection to continue tracing connected edges, even if the number of branches is odd.

One of the biggest features of MODO 901 is of course the cleaned-up Boolean functions together with the new version of MeshFusion. It even has its own tab now, so you no longer have to struggle with frustrating Boolean operations.

Making the car image above with symmetry was heaven – even when you have models that have topological or certain flow requirements, but





not spatially symmetrical (like a fuel tank in this case), 901 still lets you tweak both sides at once.

Next to this, MODO is very user-friendly when it comes to making environments because of the easy layer support on the right side. Combine this with the awesome Super UV tools and it's easy to get started. And we can't talk about Super UVs without mentioning the amazingly fast UV tools of MODO. Linking stitching, relax and autounwrap commands to shortcuts can make the unwrapping process a joy. It even becomes a bigger joy now that there are both regular and UDIM multitiled UVs – together with improved workflows for straightening, aligning, transferring and packing your UV isles. Switching from the Modeling tab to the Unwrap tab is really easy as well.

We almost forgot to mention the amazing Seneca script for MODO. Seneca is a gigantic libary of scripts, to make your pipeline super fast and the great thing about this is that you can link shortcuts to these scripts. One script we use almost everday is 'The Perfect script', which is now integrated into MODO 901 as well, so that you don't have to search far to shortcut this one (**indigosm.com/modoscripts.htm**).

What we do think is missing from MODO 901 though is a modifier stack, like the ones you have in 3ds Max, so that you can work less nondestructively. You could also perhaps be given the ability to tweak Bézier curves, because now when you made your curve you're not able to go back in and tweak the shape of it.

Still there is plenty to talk about, with old and new tools in MODO. Just give this wonderful piece of software a chance.

Matthias Develtere

> One of the biggest features of MODO 901 is of course the cleaned-up Boolean functions together with the new version of MeshFusion

TOP LEFT It may be a bit silly, but there's a Start Render button now. If you accidentally click the tab, it won't render, which is really helpful if you accidentally press it with a heavy model

BOTTOM LEFT No more error screens. You don't need closed meshes to perform a drill or have to use the Booleans tool anymore, which makes welding and sculpting really easy

BELOW Unwrapping pipes is made more efficient when combining the 'old' Peeler tool with the new Rectangle UV – it only works with grid patterns though

Essential info

Price	€1,199
Website	thefoundry.co.uk/products/modo/buy/
OS	Windows 7 or Window 8 (64-bit only) / Mac OS X 10.8 and up (64-bit only) / Linux 5.4 and up 64-bit only)
CPU	Core 2 Duo processor and up
RAM	Minimum 4GB
HDD space	10GB

Summary

★★★★½ **Features**
★★★★½ **Performance**
★★★★★ **Design**
★★★★½ **Value for money**

Verdict ★★★★½

MODO 901 has a gigantic range of tools, so you never have to switch to other software

KeyShot 6

The renderer's newest features shows a powerful side that will let artists make their renders sing

KeyShot is a piece of software that has long been known for its simplicity, beauty and power. With the newest edition of KeyShot, Luxion has opened up doors to those who want more control while also keeping true to its intuitive roots. The new additions show that Luxion has intent to make KeyShot 6 a real contender in the render engine market.

Let's start with the biggest new feature, the Material Graph editor. Again, great for someone who is a node stud, all the way down to someone who thinks that nodes are those scary things that keep you from getting freelance jobs. You can jump in and tune something up or dive deep and control every parameter with a plethora of new options. This new interface can be used as part of the creative process as well. With the blazing-fast rendering you can move through many iterations in literally minutes. There are so many new options, we will just touch on a few that we loved.

Let's start with the Occlusion node: a feature that has been missing in KeyShot for a long time. Most of you will already be associated with ambient occlusion from other software packages, best known for showing small detail and adding lots of realism to shadows. So Luxion decided to add this as a node and thus as a material.

Next up is Curvature: a very unique looking effect. It takes into account the way that light is hitting the curvature of the geometry and affects it accordingly. This is a really good choice for getting amazing complex shines on visors and sunglasses.

Scratches and Spots are very similar, and these are both procedural textures with all the right parameters to fit the bill. They are great for some light wear and tear or water spots – just crank them up and watch the patterns emerge. You can achieve some very illusive effects by making use of these options.

Now let's get into the new lighting presets, which are great for when you need something looking great. Some of these specific lighting scenarios will fit many common needs. That said, we were having fun just clicking around them and seeing what stuck.

In terms of what we may expect, there is Performance mode, which is the same as Performance in previous versions and it's great for tweaking big scenes. Then there is the default setting which is pretty much business as usual.

There is also a new Product setting that, believe it or not, is great for products! It's great for concentrating on specular highlights and will leave art directors dumbstruck. The interior is classy and refined, and is a great setting to light those tricky interiors. It will provide rays of vibrant afternoon

FAR LEFT The node-based material graph increases the creative footprint of KeyShot 6

TOP LEFT New procedural textures mean you're spending less time switching programs and more time dazzling ADs with great renders!

BELOW The newly added Occlusion node is great for highlighting small details

> "Opening up KeyShot 6 feels like the first time you got the keys to a new car. You have all the control – it's up to you where you want to go"

BELOW The fun new lighting presets are just another great way to explore the vast creative options

BELOW With so many new options you can nail down exactly the look you're going for with sniper-like precision

light in just a click. Otherwise, there is Full Simulation and Global Illumination for caustics and high sample counts! There is also a Custom setting and again, Luxion is giving control to the user here, meaning another gold star from us.

Luxion has the forgetful 3D artist in mind with KeyShot 6 as you can now edit geometry inside the program. Rather than popping back into your modelling package to edit, you can stay in KeyShot and keep making really great renders. With the Material Graph, KeyShot can now displace several programs and keep you in the creative process. Along with that, KeyShot has expanded the import options to almost everything you would ever want – the C4D file import was the most exciting for us (splines for hair!). There are so many other amazing features such as multilayer PSD export, a scripting console, new VR functions and all manner of animation options, to name a few.

Opening up KeyShot 6 feels like the first time you got the keys to a new car. You have all the control – it's up to you where you want to go. KeyShot 6 wears a lot of different hats, and does it well. Luxion has shown ambition to meet demand with its new features, and if this trend continues, we bet that you will start seeing a lot more credit given to this once modest renderer.

Andy Jones

Essential info

Price	$995
Website	keyshot.com/keyshot-6
OS	Windows 7 32-bit and 64-bit, Windows 8 32-bit and 64-bit / Mac OS X 10.7 and up
Mouse	Three-button
RAM	Minimum 4GB
Display	1024 x 768 and up

Summary

★★★★★ **Features**
★★★★★ **Performance**
★★★★★ **Design**
★★★★½ **Value for money**

Verdict ★★★★★

KeyShot 6 produces stunning renders easily and quickly. Having it in your arsenal will leave you with more time to push your work to the next level

ABOVE A selection of annotation tools let you quickly communicate ideas and revisions in still image and video format

Frankie

We find out if the web-based meeting tool could spell the end of scrawled notes during Skype calls!

Anyone who has been working in a creative environment that spans across several studios, or with outsource partners, will of course understand the sheer difficulty of accurately collating notes at the end of a video call and then getting these notes back to everyone.

Frankie, a browser-based video collaboration tool by Cospective, aims to change that. The thing that sets Frankie apart from other video-calling applications is that it stores any annotations or edits to the images or video content that you upload for the call in a handy PDF. This is then available from a central cloud-based repository and this is a fantastic feature, especially in long design reviews where multiple assets are under discussion and feedback can often get missed or misinterpreted in hand-written notes. So does it do what it says on the tin, or is using Skype and a notepad still the industry standard?

Our first impression of Frankie is that the UI has been well thought out and cleanly designed. Not everyone needs a Frankie account either, with attendees being invited either by a copy-and-paste link or via an email button. Our only hitch here is that it defaults to Outlook, and this is something that we would want changed to another email provider for our own primary email provider, but at the time of review we couldn't find that feature available to us.

Assembling images and videos for upload is quick and simple though, with everyone being able to share media to the call that they are in. Frankie has a selection of annotation tools for you to use here, as well as a handy laser pointer to draw attention to elements without having to save them out in the PDF itself. We found the autosave feature handy, as at one point during the call our internet dropped out, but we were able to reinstate the call with all feedback stored and continue without having to backtrack to previous notes taken.

At the end of the call the host has the option to leave the lobby open for further discussion, useful for when production want to talk shop without the artists messing about! The feedback is saved to the host's cloud-based storage either for review, download or to even reopen and use as the basis for the next meeting.

We never touched the video side of Frankie, but we think that for animation reviews and VFX breakdowns the ability to pause, annotate and then continue play with timestamps at the desired points of feedback is a huge feature that Frankie has over other video-calling software.

In the future we would love to see Cospective add the ability to record voice chat for playback as well as add timestamps to the audio log, but for the time being the feature set that it does have right now makes Frankie an excellent tool for large-scale collaborative works.

Seth Nash

Essential info

Price	£31 - £159 per month / $49 - $249 per month
Website	cospective.com/frankie
OS	Windows 7 and up / Mac OS X 10.8 and up
RAM	4GB
Web browser	WebGL enabled
Voice chat	Headset or mic required
Display	Minimum 1920 x 1080

Summary

★★★★½ **Features**
★★★★★ **Performance**
★★★★★ **Design**
★★★½☆ **Value for money**

Verdict ★★★★½

If communication is king, Frankie might just be the next successor to the throne

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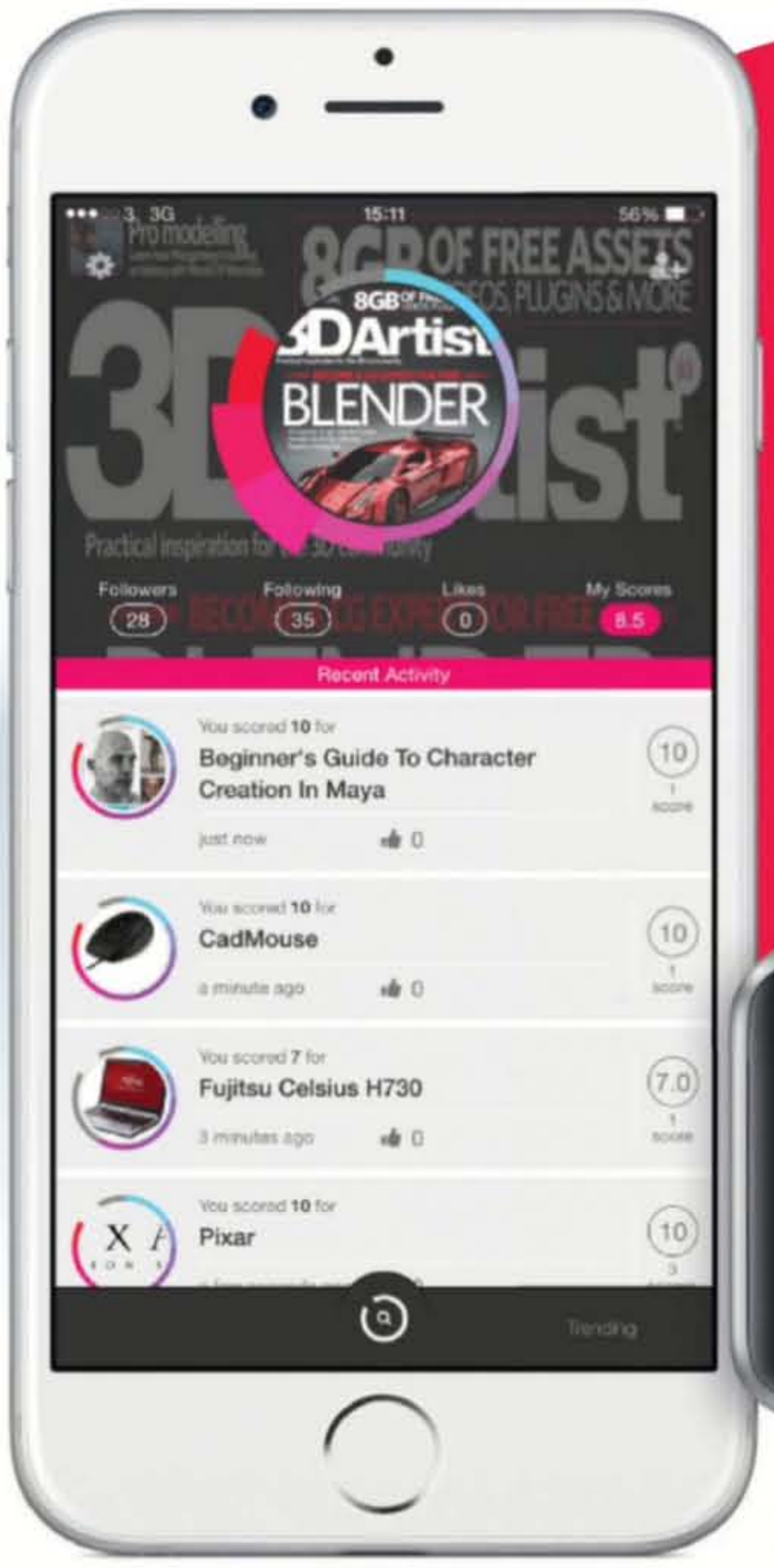

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8.0 — 3DArtist scored **8** for Substance Designer 5

Fujitsu CELSIUS M740

Fujitsu's mid-range 3D-focused workstation performs superbly while remaining silent in use

The cryptic naming systems that Fujitsu uses for workstations is never clear, but a good guess could be that the M in the CELSIUS M740 desktop tower system was short for 'middle of the road'. It's one of five separate lines of workstation from Fujitsu, with the H series being mobile systems and the C series being 1U rack-mount renderers.

The supplied specification is definitely right in the middle of the staggering range of customisation options and upgrades offered on Fujitsu's site. The CELSIUS M740 caters for all sorts of users, so it can be configured as a serious 3D monster, with an AMD FirePro W9100 and up to 256GB of DDR4 ECC memory, or a more entry-level machine, with a graphics card such as Nvidia's Quadro K620.

GPU compute cards such as a Tesla or GRID K2 are available as well, but there's only the option of a single Xeon CPU, ranging from the fairly basic Xeon E5-1603 v3 up to the ten-core Xeon E5-2687W v3. And of course, this means a range of price points as well, from around £1,500 right up to five-figure sums.

Our system came with a configuration that is tailored for the sort of performance-focused 3D we like to see, with a fast clock speed and great GPU. It has a quad-core Intel Xeon E5-1620 v3 running at 3.5GHz, with an Nvidia Quadro K4200 and 16GB of memory, along with a 256GB Toshiba SSD.

It's fitted in a rather plain desktop PC chassis, its only distinguishing feature being Fujitsu's standard red trim around it. A Blu-ray writer is included and there are four front-mounted USB ports to complement the six at the rear.

This configuration costs £2,004 inc VAT, a fairly reasonable price for a desktop system with this specification. The mainboard is based off of Intel's C612 professional chipset, but is actually a proprietary design called D3348 from Fujitsu, which claims its tweaks lead to better longevity.

That's not something that can easily be tested, unlike a further claim from Fujitsu. Apparently the entire system outputs fewer than 20dB of noise, and usually this is an issue with workstations which have high noise levels when tasked with a long rendering job. In use, it was whisper-quiet, even when running our benchmarks for a few hours.

RIGHT It might be plain Jane to look at, but the M740's specification hits a sweet spot for 3D artists

ABOVE Up to 256GB of DDR4 ECC can be upgraded for more memory in the M740

RIGHT Hard disks, PCI Express SSDs and a range of graphics cards can also be added

ABOVE You can configure the M740 so that it has relatively cheaper components, like with an Nvidia Quadro K620

ABOVE But the Nvidia Quadro K4200 is more than capable of detailed 3D work without ballooning the overall price point

This specification is remarkably similar to that of Lenovo's Thinkstation P500, which uses the exact same graphics card and a Xeon E5-1630 v3, which is 200MHz faster.

And the results show it performing nearly identically. The SPECviewperf and CINEBENCH results were five per cent below the P500's score. For example, the catia-04 result came out as 68.05, versus the P500's 65.56.

The 3ds Max test was 11 seconds slower at default resolution with a final time of 4 minutes 16 seconds, and 40 seconds slower at 1080p.

Given that the P500 is an excellent mid-range rendering machine, the same can be therefore be said of the M740. This configuration is a bit cheaper than the P500 we reviewed, and not quite as fast, but a fair bit quieter.

Although 16GB of memory is really a base level now for all performance 3D, and we'd prefer a bigger SSD, both can be upgraded when you order. The rest of the CELSIUS M740's specification is absolutely spot on for all but the most specialised and demanding projects.

Orestis Bastounis

> "In use, [the M740] was whisper-quiet, even when running our benchmarks for a few hours"

Essential info

Price	£2,004 inc VAT
Website	fujitsu.com/uk/products/computing/pc/workstations/celsius-m740
CPU	Intel Xeon E5-1620 v3 (3.5GHz)
RAM	16GB DDR4
GPU	Nvidia Quadro K4200
SSD	256GB Toshiba
OS	Windows 7 or 8.1

Summary

★★★★☆ **Features**
★★★★☆ **Performance**
★★★☆☆ **Design**
★★★★☆ **Value for money**

Verdict ★★★★☆

Silent, and with the right configuration, the M740 is deadly efficient at 3D tasks

CEL Robox 3D printer

The UK's answer to easy desktop 3D printing is an impressive accomplishment

First funded with the help of a Kickstarter campaign that raised more than twice its original £100,000 goal, CEL's Robox 3D printer certainly garnered a lot of attention – even before being made available to buy.

Its unique selling point was a major part of the reason why; the Robox was built with a brand new printer design that you notice as soon as you take the friendly looking, small machine out of its box: a dual nozzle system. Unlike other dual-nozzle desktop printers, however, the Robox nozzles aren't separate and they don't take separate filaments either. In fact, the printer can only take one 1.75mm filament reel at a time. The reason for this is because the Robox was constructed to have one nozzle print fine details, while the other fills out the larger areas of the print, ultimately resulting in speeds that are up to 300 per cent faster than some of its competitors.

This was particularly clear when we tested the machine with a simple **3D Artist** magazine logo keychain made in Maya in an hour, then converted into a print-ready STL file with Blender. At the Robox's 'Standard' quality of print, which would come out looking pretty perfect, the print time was only 30 minutes – bringing the total time required to create and print our own keychain with a personalised logo from scratch to, amazingly, just under two hours.

Actually setting up the Robox ready for use was really easy too. The printer is already fully assembled out of the box, and is both very light and small at around the size of a normal inkjet printer, making it perfect to put on a desktop.

The Robox only needs to be connected to the power supply and a Windows, Mac or Linux machine to come to life. Sending a model to print then involves downloading CEL's proprietary software, AutoMaker, for free.

AutoMaker itself is incredibly simple to use. It takes the user through the entire calibration process for setting up the Robox step by step, then lets the user simply import their file, resize it, and visualise exactly where it will print and how big it will be on the in-software print bed. Despite its size, the build volume for the Robox is pretty big at 210 x 150 x 100mm, and AutoMaker does allow for more experienced users to modify specific settings such as infill amount and the final quality of the print (the best resolution of which goes up to 20 microns) for larger projects.

The Robox also has some other very nifty new features. Though there is no SD drive or pen drive slot to send your file to the printer without it being connected to your machine, AutoMaker does include the ability to automatically recognise filament materials, as well as pause and resume prints whenever needed. Bed levelling and filament extraction can also happen automatically, and a wide range of full RGB internal lighting can easily let a user know what is going on in the print process.

The sheer amount of materials the Robox printer can use is also impressive, including PLA and ABS as well as HIPS, Nylon, PC and PVA – though official CEL materials currently come in just ABS or PLA. Any 1.75mm reel can be used though, not just the CEL Robox own-brand ones.

In fact, aside from some nozzle errors during calibration at the very start – which were resolved by simply extracting and reintroducing the filament – the only real problems we found throughout testing were with the printer's door on our model. The build volume being housed in a closed structure is of course better with regards the internal temperatures staying constant (for less warping in prints), as well as being safer for kids and pets to be around.

The door locking, however, was frustrating due to the fact that the only way to unlock it was through a button in the AutoMaker software. If in the middle of a print, you'd need to wait for the printer to fully cool down for 20 minutes before being able to open the printer door to remove a stray piece of plastic on the print bed, for example.

Larissa Mori

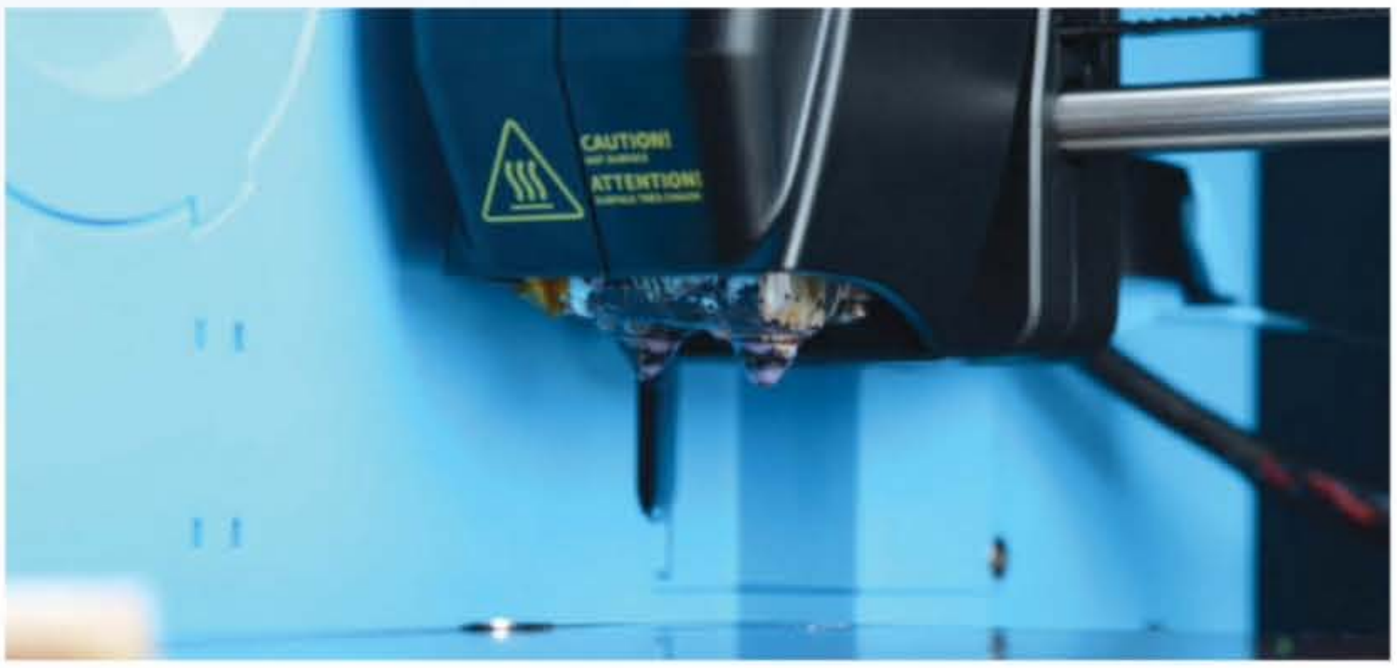
ABOVE Learn more about CEL and the Robox 3D printer, including where to buy and technical features, at **cel-robox.com**

RIGHT Though the perfect size for the office, some might find 3D printers like the Robox too noisy

> The Robox only needs to be connected to the power supply and a Windows, Mac or Linux machine to come to life

ABOVE With the ability to pause and resume printing, the Robox makes it easy to come back to prints later on

BELOW The Robox has a best layer resolution of 20 microns and an impressive build volume for its size



BELOW At £999, the Robox is more expensive than other printers, like the 3DSystems Cube

Essential info

Price	£999 / $1,799
Website	cel-robox.com
Build Volume	210 x 150 x 100mm / 8.3 x 5.9 x 3.9"
Best layer resolution	20 microns
Bed levelling	Automatic
Material compatibility	PLA, ABS, HIPS, Nylon, PC, PVA
OS	Windows, Mac, and Linux. Linux currently requires proprietary Nvidia graphics drivers

Summary

★★★★☆ **Features**
★★★★☆ **Performance**
★★★★☆ **Design**
★★★☆☆ **Value for money**

Verdict ★★★★☆

A fun little printer that's perfect for both beginners and intermediate users, with impressively quick print times

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The Hub

The inside guide to industry news, VFX studios, expert opinions and the 3D community

WIN £10,000 WORTH OF SOFTWARE **Page 90**

090 Community news

Win £10,000 worth of software

3D Artist teams up with the BFX Festival and two great charities to bring you an awesome competition

092 Industry news

Image Engine and Cinesite merge

Plus Dimensional Imaging upgrades DI4Dtrack and AAA Studio releases a new renderer

094 Social

Reader's Gallery

The best images created by the **3dartistonline.com** community

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Closes 14 October 2015

Win £10,000 worth of software with BFX

In conjunction with the 2015 BFX Festival, 3D Artist is thrilled to announce a special competition for its readers!

To be in with a chance of winning our fab prizes, choose one of the short, highlighted scripted scenes detailed on the next page and produce a fully rendered and lit scene that creatively interprets the emotion and drama of the narrative.

The two scripts were chosen by two great charities, The Anthony Nolan Trust and Dyslexia Action, as part of this year's BFX Competition, which is being supported by Kingston Smith. Your visuals will need to be supported by a short written treatment of around 250 words that is both creative and technical – it should clearly explain your methodology and choice of software platforms as well as describing your creative intentions.

This amazing competition has been split into two distinct categories: Students/Hobbyists and Professionals/Graduates, with a first-place and second-place prize for each category. **To enter this incredible competition, send your final hi-res image to 3dartist@imagine-publishing.co.uk via WeTransfer.com, and a separate accompanying email detailing your name, image title and whether you are a Student/Hobbyist or Professional/Graduate. Make sure you use the naming convention: Image Name (Category).**

1st prize – Professional/Graduate
- 1 x Houdini Base
- 1 x Commercial V-Ray
- 1 x RealFlow
- 1 x The Foundry Production Collective (MODO, MARI, NUKE) – Commercial licence
- 1 x Maxwell Render

2nd prize – Professional/Graduate
- 1 x RealFlow
- 1 x Commercial V-Ray
- 1 x 6 months access to ftrack for up to 10 users

1st prize – Student/Hobbyist
- 1 x Academic V-Ray
- 1 x The Foundry Production Collective (MODO, MARI, NUKE) – Student licence
- 1 x Maxwell Render

2nd prize – Student/Hobbyist
- 1 x Academic V-Ray
- 1 x 6 months access to ftrack for up to 10 users

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'Pageturner – A love letter to Literacy' chosen by Dyslexia Action

by Simon Schneider

INT. DYSTOPIAN RAMSHACKLE LIBRARY. DAY.

A young GIRL in tattered clothes enters a library, everything is in ruins.

She's watched from the shadows.

She turns down one aisle and shuffles through it cautiously.

SNAP, books jump out at with jagged page-teeth. She dodges and manoeuvres away from them.

Backed into a corner, the books surround her, snapping like piranhas. The girl grabs a nearby stapler, shooting staples at the books that leap. Mid-flight they get flung back.

Just before the girl is overwhelmed she notices two glowing eyes from the darkness, she's awash with fear.

CLICK CLICK. The stapler is out and the figure in the darkness pounces.

Cowering, the girl closes her eyes.

INT. ORDINARY PUBLIC LIBRARY. DAY.

When she opens them, she's met with a sympathetic librarian. The librarian lends her a hand to help her up.

Sitting at a table, the girl is helped by the librarian in reading a book.
SUPERIMPOSE: Dyslexia Action is devoted to changing the lives of people with dyslexia.

'Saved by the Cell' chosen by Anthony Nolan

by John Thornton

EXT. EMPTY WHITE SPACE. DAY.
Pop. TOM, a simple lad, appears.

VOICE OVER
This is TOM. Say hello TOM.

TOM has a little gulp and does an awkward, little wave.

VOICE OVER
(cont'd)
This is what Tom thinks stem cell donation is like.

Darkness. Big, muscly DR VAMPIRE crashes in – Tom screams. Dr V's fangs are two huge syringes – Tom screams louder.
Dr Vampire ties him up whilst reading a book called 50 Shades – Tom screams loudest.

VOICE OVER
(cont'd)
Pretty scary, huh? But that's not what it's like.
Silly Tom.

Lights up. Dr Vampire chuckles, ruffling Tom's hair.

VOICE OVER
(cont'd)
It's mostly just lying in bed.

Tom raises his hand excitedly, pointing at himself.

VOICE OVER
(cont'd)
Yes Tom, even you can do that.

Pop. Dr Vampire's gone. In bed, Tom floats through rainbows with a TV.

VOICE OVER
By donating stem cells, Tom's giving something very special. Better than an Xbox! Tom's giving someone hope. Well done Tom.

A patient and doctor float next to Tom. He gives them a thumbs up. With small smiles, they thumbs up back. Anthony Nolan logo, details appear on screen:

VOICE OVER
To find out how you can be a hero like Tom visit **anthonynolan.org**

Some extremely attractive NURSES swoon over Tom in his bed.

VOICE OVER
Pffft, no, the nurses won't be like that.
Sorry Tom.
Pop. The nurses disappear. Tom looks glum.

CG Cookie's Blender treats

Jonathan Williamson and Kent Trammell (instructors from CG Cookie) explain the power of Blender

Jonathan Williamson

Kent Trammell

What are the main misconceptions non-users have about Blender?
JW: The biggest misconception is the quality of the interface. Blender has had a stigma for years now that it has the worst interface, that it's clunky, and that it's hard to use. I think this is misguided and wrong now (maybe not so much in past) as Blender has come so far and now is incredibly fast, flexible and powerful in many areas, including the interface.
KT: I think the 'free' price tag causes scepticism from professionals. The 'you get what you pay for' rule implies that a multithousand dollar software is surely more competent than a free, hacked-together-by-the-community software. While that does tend to be the truth in many open source cases I'll say, based on my experience, that Blender seems to be an exception.

What's most exciting about Blender's toolset?
JW: The most exciting part of Blender's modelling toolset, in my opinion, is one of its oldest features. This is the Select>Edit modelling workflow as opposed to the more common Tool>Select>Edit workflow. In essence this means that Blender lets you work very quickly based on quick hotkey actions (such as extruding a selection at anytime by simply pressing E) rather than requiring you to first specify a tool and then perform the action. The real benefit to this is speed, as you can instantly activate different tools and operations with a single click or hotkey. This workflow makes mesh modelling behave more like sculpting, in the raw speed and efficiency.

Have you experimented with 3D printing?
KT: The Ticketeer character was my first 3D printing project. It's quite a cool feeling to create something in the computer and eventually hold it in your hands! Blender comes packed with a very helpful add-on called 3D Print Toolbox that helps to get technical details correct for printing. My new dream is to model and print custom toys for my baby boy when he grows up.

The character he calls the Ticketeer was Kent Trammell's first 3D printing project

Cinesite also worked on the Tom Cruise and Emily Blunt sci-fi feature *Edge of Tomorrow*

Cinesite and Image Engine to merge

The two VFX houses are to form a single entity with 525 staff over three locations

London's Cinesite and Vancouver's Image Engine are becoming one, with a combined staff of 525 and the capacity to grow to 675. The new company will have homes in London, Vancouver and Montreal and the plan will be to build its capacity to create visual effects and animation across all of its studios, sharing work between the three facilities.

"Cinesite and Image Engine are totally complementary to each other," states Antony Hunt, Cinesite's managing director. "We will continue operating in our various geographical locations and our focus will continue on our different core visual effects strengths. In addition, Cinesite is also leading the charge into feature animation. We're working on very compelling projects including original IP from our development company, Comic Animations Ltd, and on projects brought to us by the studios. This work can now be shared across all three locations."

Greg Holmes, Image Engine CEO adds, "In addition to widening our reach to achieve even greater heights in high-end visual effects, this alliance will present new career development opportunities for all our artists and crews and will deliver benefits and opportunities to all our stakeholders, be they staff, customers, suppliers, financial partners or shareholders."

Image Engine was set up in 1995 and was nominated for an Academy Award for its work on 2009's *District 9*.

A brief history of Cinesite

Cinesite opened in London in 1994, and has created award-winning animation and VFX for films like *Iron Man 3*, the *Harry Potter* series and *X-Men: Days Of Future Past*. In 2012 the company went through a management buyout, splitting from parent company Kodak and its financial troubles. Overseas expansion was the plan, and in 2014 Cinesite opened its own Montreal office, largely to work on *The Man From UNCLE* by Guy Ritchie.

AR makes driving more dangerous

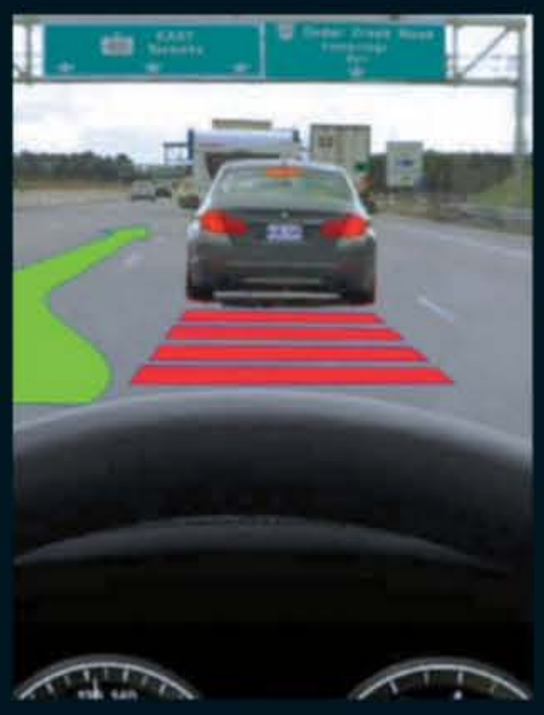
Instead of helping drivers, augmented reality is a hindrance, finds study

Warnings, signs and signals that appear on windshields – presumed to be one way in which technology can make the roads much safer – in fact often distracts drivers, a study conducted by the University of Toronto has discovered.

"Drivers need to divide their attention to deal with this added visual information," said Department of Psychology professor Ian Spence, who wanted to know what happens when two sources of information appeared in a driver's visual field. "Not only will drivers have to concentrate on what's happening on the road around them as they've always done, they'll also have to attend to whatever warning pops up on the windshield in front of them."

Participants in the computer-based study were shown dots and shapes and then asked to recall what they were shown, but the two visual tasks were shown to interfere with each other.

The study 'The Commingled Division of Visual Attention' was published on PLOS ONE, and you can find out more at **utoronto.ca**.



The vehicle ahead poses a danger if the red zone is entered. But will AR pose a danger if we stop watching the real world in other ways?

HAVE YOU HEARD? The winner of SIGGRAPH's Best In Show turns Olympic athletes into abstract shapes to analyse movement

DI beefs up DI4Dtrack

Glasgow's facial performance capture company has released a new version of its tracking package

Having recently been used on *Quantum Break*, *Houdini* and *Merlin*, DI4Dtrack has long been a powerful tool for getting animation data from an actor's performance, but Dimensional Imaging is confident that the latest version is taking its power to a new level. New features include Enhanced Timeline Navigation, Whole Head Tracking, Soft Selection Tools and Support for Sub-Sequences.

"After listening to customer feedback and incorporating this into the software," says Dimensional Imaging CEO Colin Urquhart, "we think this new version will deliver an improved user experience for faster facial tracking and quicker editing. Once fully launched, our current customers will be able to take advantage of all the benefits the upgraded software will give them."

Several hours of facial animation were used for in-game animation in *Quantum Break* © *Quantum Break* images courtesy of Remedy Entertainment Ltd

The wide shots used a 3cm model of the girl, with the close-ups needing a 7cm version

New renderer from AAA Studio

More a full rewrite of the core code than a simple update, FurryBall RT is now available

Art And Animation Studio has released FurryBall RT, having gone back to basics on the code of its renderer. The new tool has Real Motion Blur, Maya Particles and NParticles, unlimited number of GPUs, tile rendering, physically based materials and lights and support for all Maya image formats. It works with Linux and Mac OS X and and the response in viewport is said to be ten times faster than before. See **furryball.aaa-studio.eu** for more.

The previous incarnation of FurryBall enabled AAA Studio to fully render this feature, *Goat Story With Cheese*, a sequel to an earlier film the studio created

3D printed film hits Annecy

One of the highlights of the animation festival was a 3D-printed, stop-motion-filmed short

One of the most notable films in competition at the Annecy International Animation Film Festival 2015 was 3D-printed short 'Chase Me'. French VFX artist Gilles-Alexandre Deschaud printed every element of the film – 2,500 pieces in total – with a FormLabs Form 1+ 3D printer and then used stop-motion animation. See **annecy.org** for more information.

BOXX partners with Centerprise

The VFX-centric workstation manufacturer teams up with IT giant

Centerprise International has entered into an exclusive partnership with BOXX Technologies. The partnership has arisen to develop sales channels into the consumer workstation marketplace – BOXX products have been especially designed for 3D workflows. A new partnership website with product porfolios will be launched in September 2015.

Software shorts

Bringing you the lowdown on product updates and launches

Blender 2.75a

The big news in the world of open source 3D creation package Blender is that it now has a fully integrated Multi-View rendering and stereo 3D pipeline. There's a new Corrective Smooth modifier in the modelling toolset and placeholders can now be added in the Video Sequence Editor. See **blender.org** for more information.

VRayGolaem for 3ds Max

Golaem has released a free plugin to act as a bridge between its crowd simulation package Golaem Studio, which is integrated into Maya, as well as for rendering in 3ds Max. While the simulation still has to be done in Maya, the plugins will cut the time wasted on workarounds for many VFX studios. Find out more about the plugin at **golaem.com**.

RocketComp for Maya

A new plugin for Maya, RocketComp will translate your 3D scene into a new project file with just one click for your compositing software. Compatible with NUKE, NUKEX, After Effects, Photoshop, Premiere Pro, Krita and much more, RocketComp keeps all your Maya details intact and costs $249 at **andrewhazelden.com**.

DID YOU KNOW? RenderMan 20 has just been released, and Pixar has been using the software for almost 30 years...

Readers' Gallery

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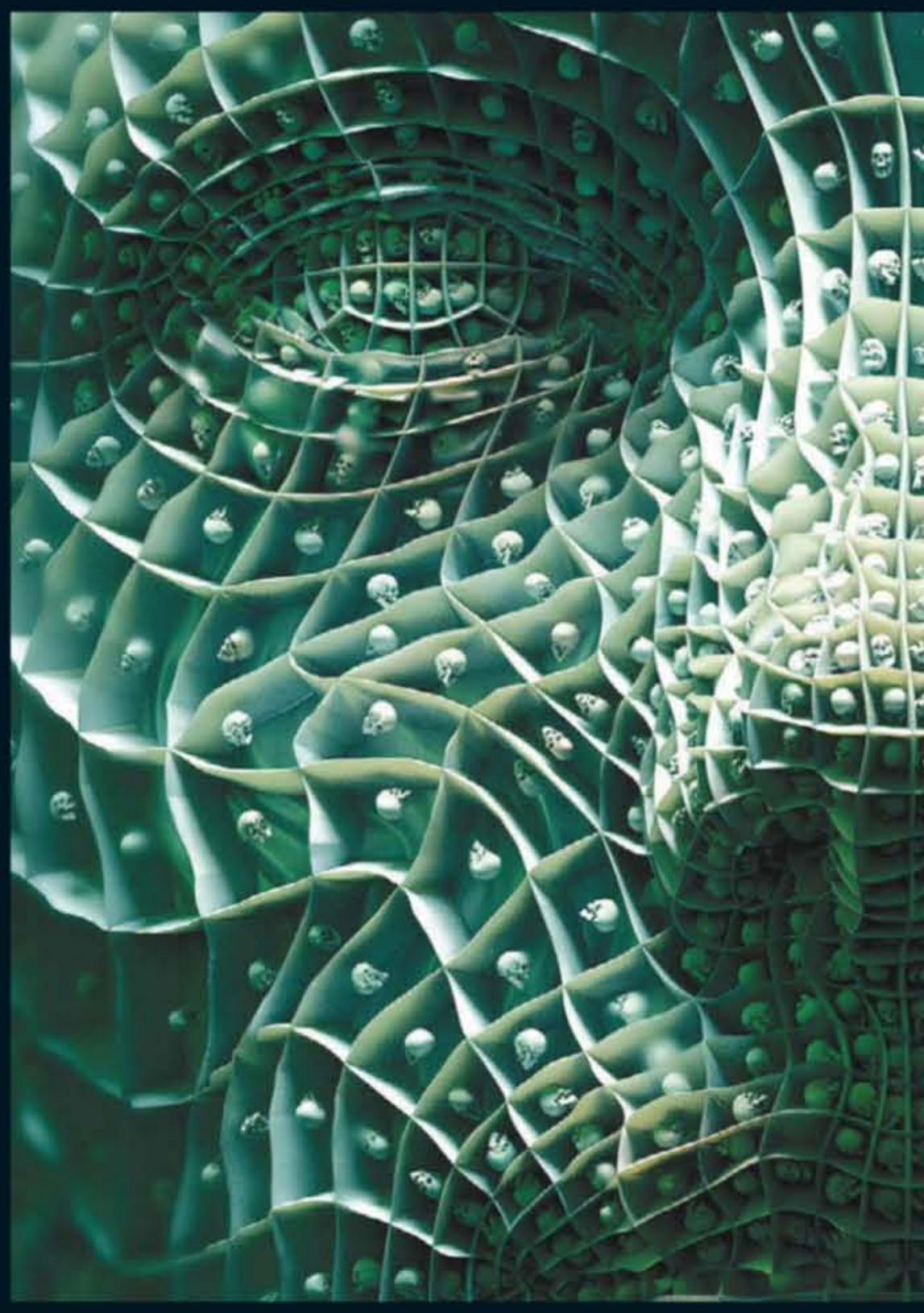
01



Images of the month

These are the 3D projects that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

03

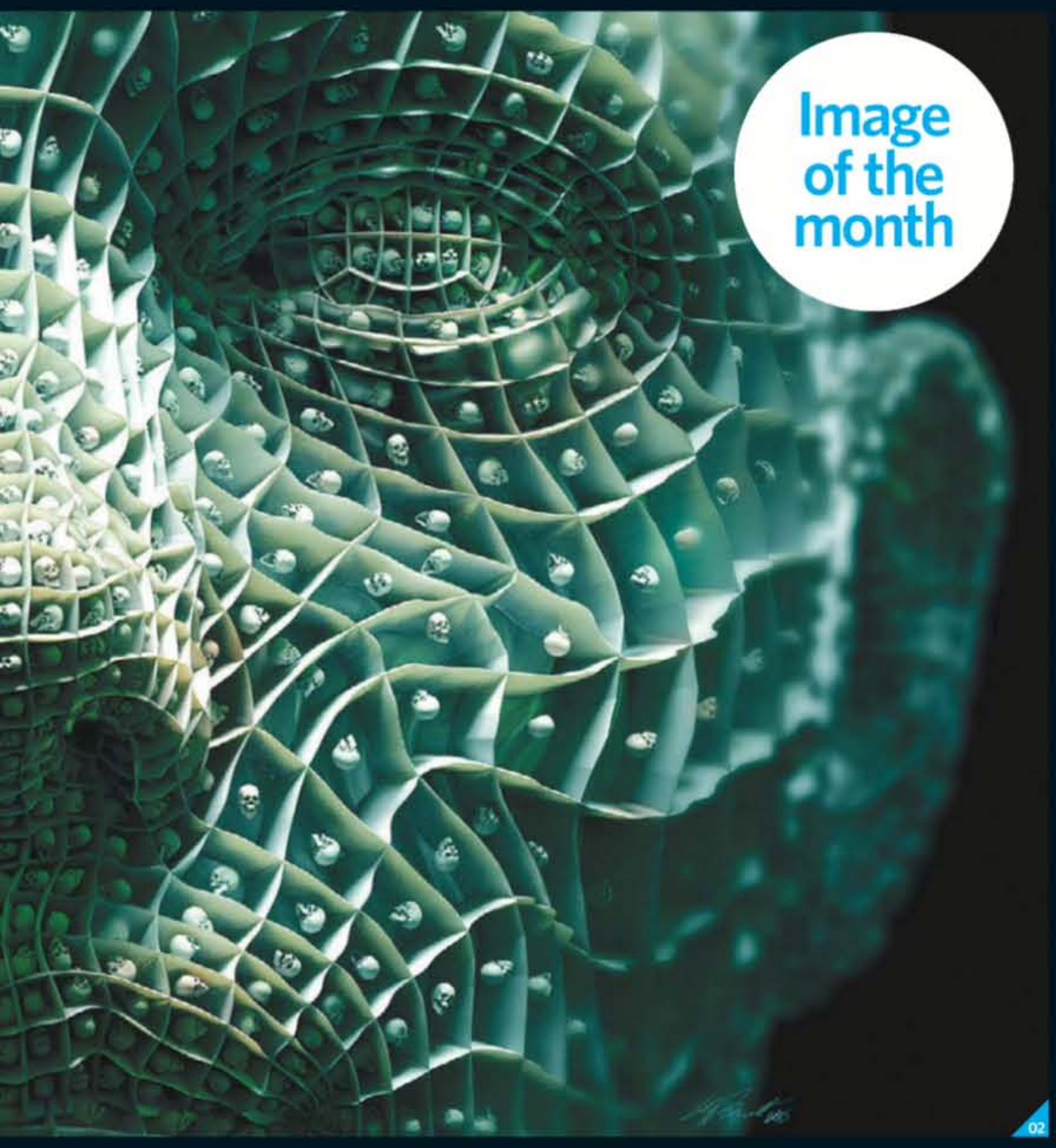
01 Kowloon Alley
by Linden Stirk
3DA username **Stirk**
Linden says: "This scene was created in Maya and rendered with mental ray. To improve render time, importance sampling with irradiance particles was used. Photoshop was used for texturing and postprocessing."
We say: *We love how intricate this image is without being overly complicated. Linden has positioned his camera perfectly, with the canted angle lending a greater sense of scale.*

02 Soul Catcher
by Steve Barrett
3DA username **stevebarrett**
Steve says: "Soul Catcher is the remnant of an old dream, created for my experimental gallery with the MODO 901 beta where I used the new Wireframe Shader and Replicators."
We say: *We love abstract art so we were really impressed with this. It's unsettling, which adds to its charm, plus it's a great advert for MODO 901's enhanced toolset.*

03 Raspberry Cream Cups
by Gonçalo Nuno Madureira
3DA username **GMad**
Gonçalo says: "I wanted to create a macro shot of a dessert to practice small details. I used 3ds Max and ZBrush for modelling, V-Ray for rendering and After Effects for postproduction."
We say: *Sometimes it's all in the presentation. Gonçalo has shown a strong understanding of composition with this image.*

04 Drift
by Vahid Montazeri
3DA username **bbbb5331**
Vahid says: "This work is from a videogame in my country (Iran). I modelled the Aston Martin in 3ds Max and then rendered in V-Ray in the drift position. I hope you like it!"
We say: *This is the second time we've featured one of Vahid's awesome cars. There's a real sense of movement that's quite impossible to ignore and the car itself looks super authentic.*

Image of the month



02

04

When Autumn Leaves **by Brandon Kynoch**
3DA username Brandon Kynoch
Brandon says: I've made this image in my free time and I'm personally very happy with the final result. It came about after a few days of being completely blank and then I thought of this!"
We say: *Brandon has replicated a very artistic style here very well. The real highlight here is the attention to detail in the leaves and the grass, both of which must have required a lot of patience.*

Bathysphere **by Christian Otten**
3DA username IgnisFerroque
Christian says: "*Myst* and *Riven* were amazing achievements for their time; I can only imagine how much work and patience was necessary for their realisation, so this picture is a bit of a tribute."
We say: *Christian's personal tribute to Myst and Riven's style and work ethic has paid off. This image looks like somewhere we'd love to explore in a videogame.*

Left **by Mateus Kurzhals**
3DA username MKurzhals
Mateus says: My intention was to give a mood of loneliness to the image. Without the owner, teddy is nothing more than an ordinary object. Poor teddy bear, he was definitely left behind."
We say: *We think that Mateus has achieved exactly what he set out to with this render. Teddy does look lonely. Our favourite little inclusion is the subtle use of particle effects – it really makes the room feel abandoned.*

T-Rex **by Marcus Whinney**
3DA username Marcus
Marcus says: "I wanted to blend tranquillity with danger in this T-Rex jungle scene. I created the dinosaur using Maya and ZBrush and comped it into its environment using Photoshop."
We say: *You can't go wrong with dinosaurs. It's a fact. Still, even if this were a plain old reptile we'd still have a lot of good things to say – the lighting and composition are superb and he's textured his beast brilliantly.*

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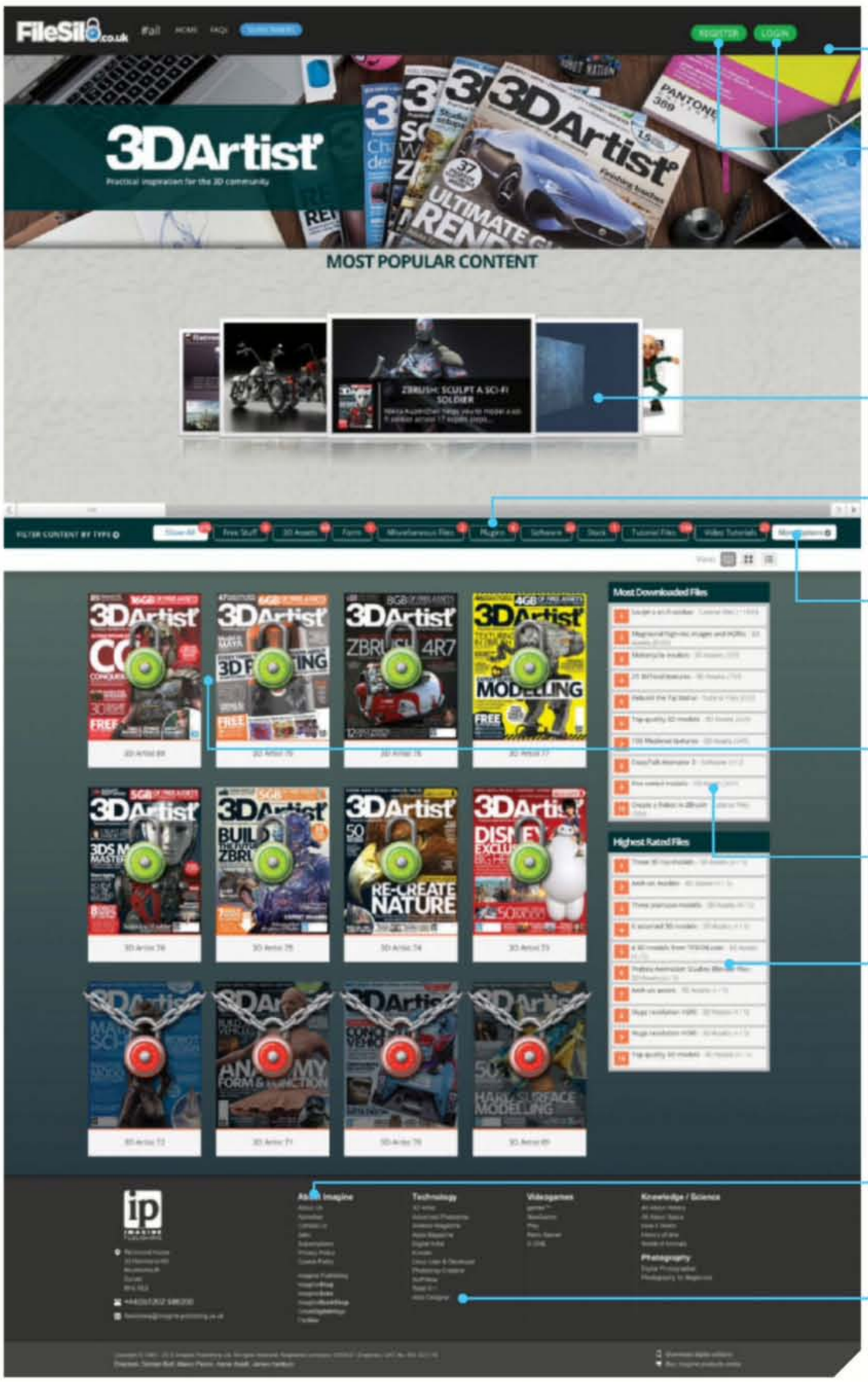

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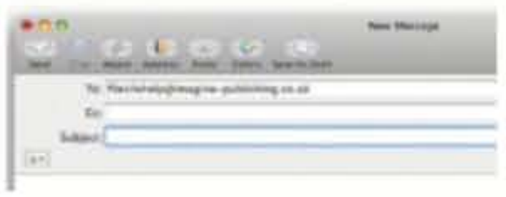

Design a hard surface helmet in ZBrush

Hit the download button for all of the accompanying images from Jon...

25 3DTotal textures

As per usual, this month we've brought you 25 premium texture maps...

5 premium CGAxis models

Hit the download button to get your hands on five awesome electronics

NEED HELP WITH THE TUTORIALS?

Having trouble with any of the techniques in this issue's tutorials? Don't know how to make the best use of your free resources? Want to have your work critiqued by those in the know? Then why not visit the **3D Artist** Facebook page for all your questions, concerns and qualms? There is a friendly community of fellow 3D artists to help you out, as well as regular posts and updates from the magazine team. Like us today and start chatting!

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Student Duncan Key
MADE THIS IN WEEK 10!

Concept Designer
Grant Gosler

We're not sure which is cooler, the fact that Duncan made this in the 10th week of DAVE School (with no prior training) or the fact that this was the second ZBrush project assigned to his class! Our students benefit from being assigned carefully planned projects with expert instruction so they are doing amazing work right out of the gate!

They are provided with world-class designs from notable concept artists and shown professional techniques, but how they use their newly acquired skills is entirely up to them. The DAVE School never provides step-by-step instruction, we push the student to find their own way through a challenge, just like they will when they go to work at a studio.

And while we are proud of Duncan, he's by no means the only one. Check out our student galleries and you will see page after page of consistently great work from a wide variety of students! Our modeling program is common to both our 12-month **VFX Production** program and our 15-month course in **Game Production.**

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